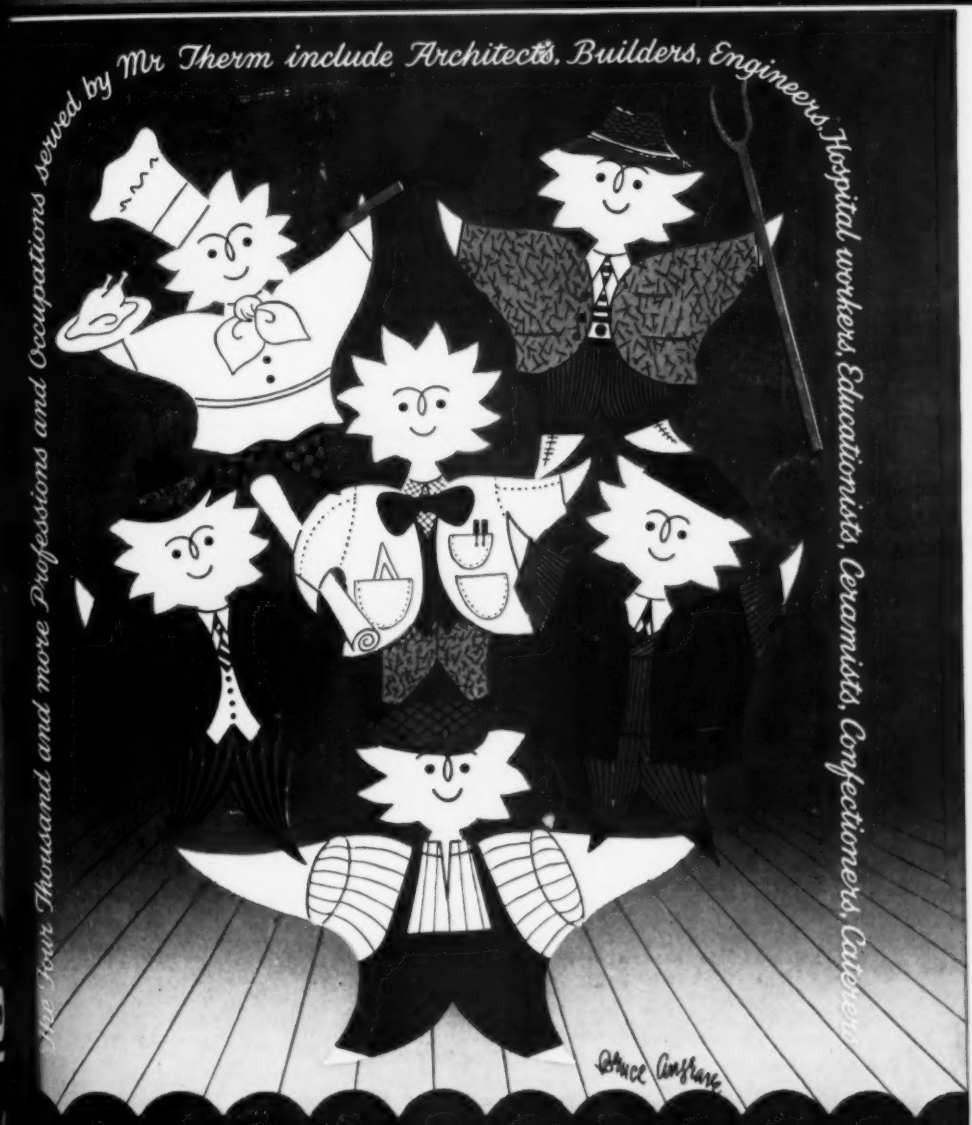
FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP DECEMBER 1, 1958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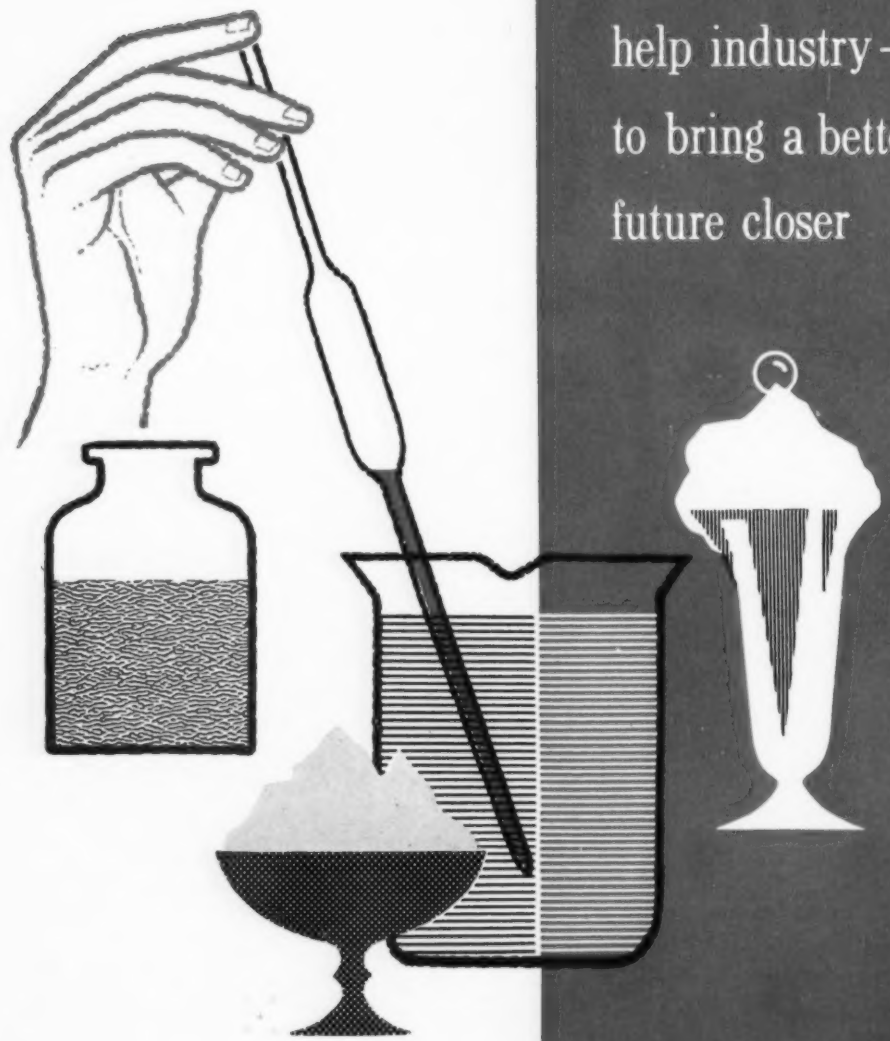

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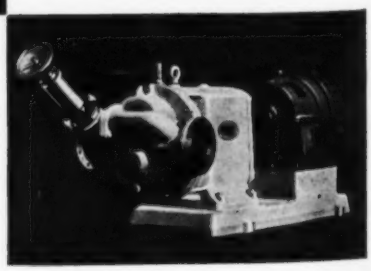

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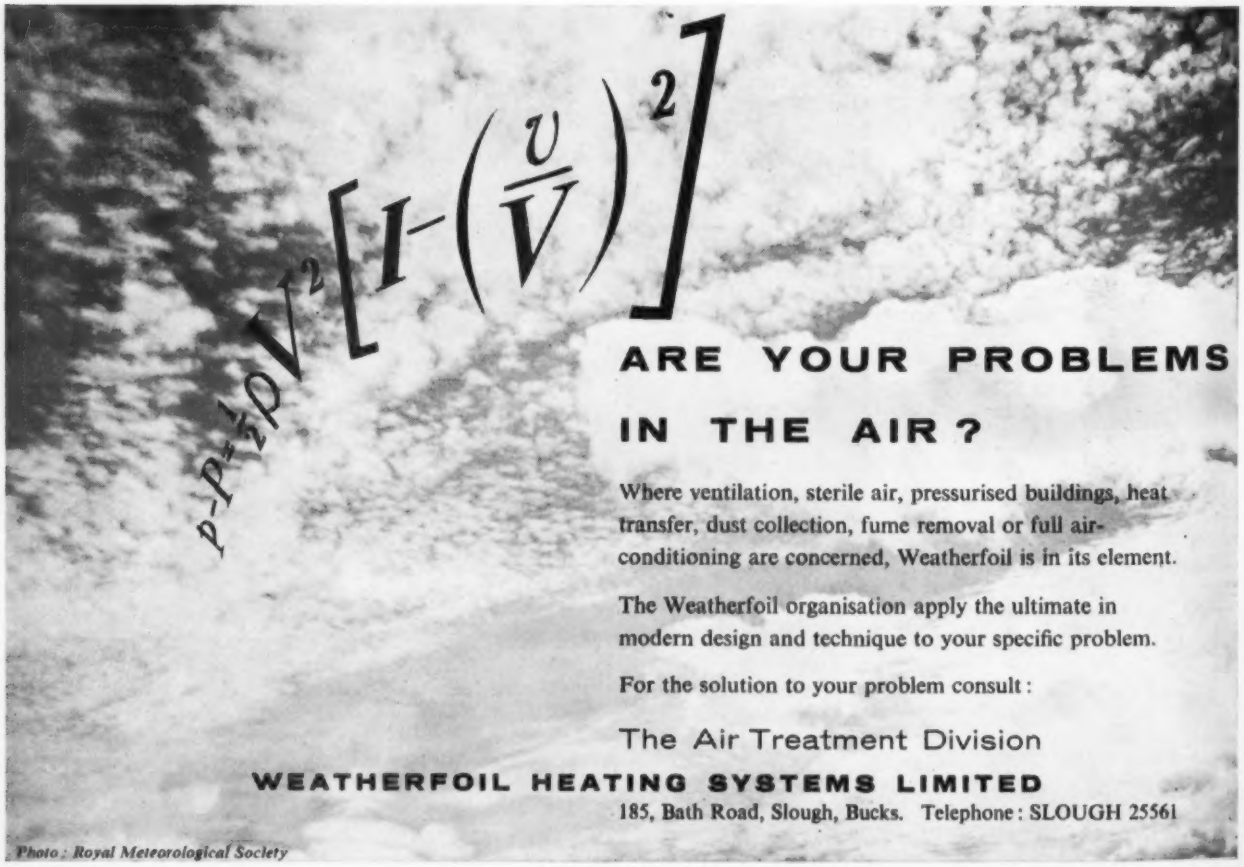
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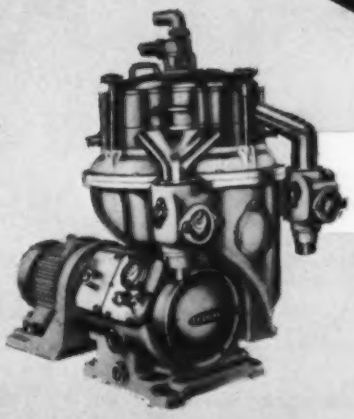

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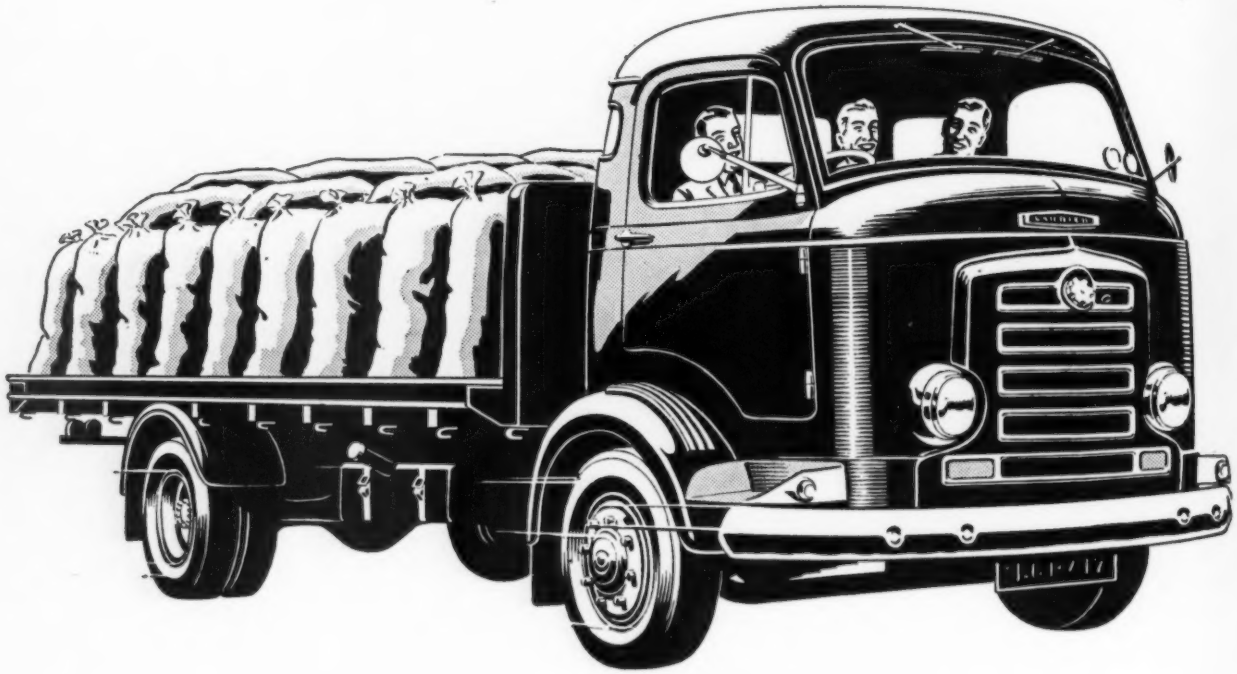

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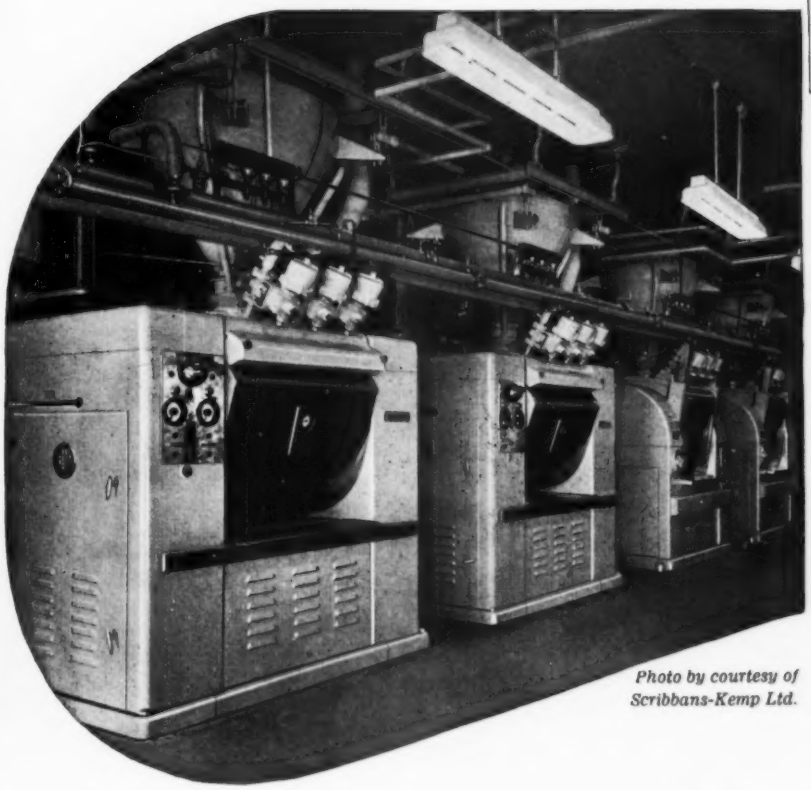

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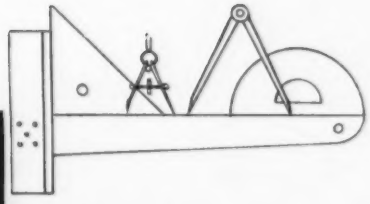

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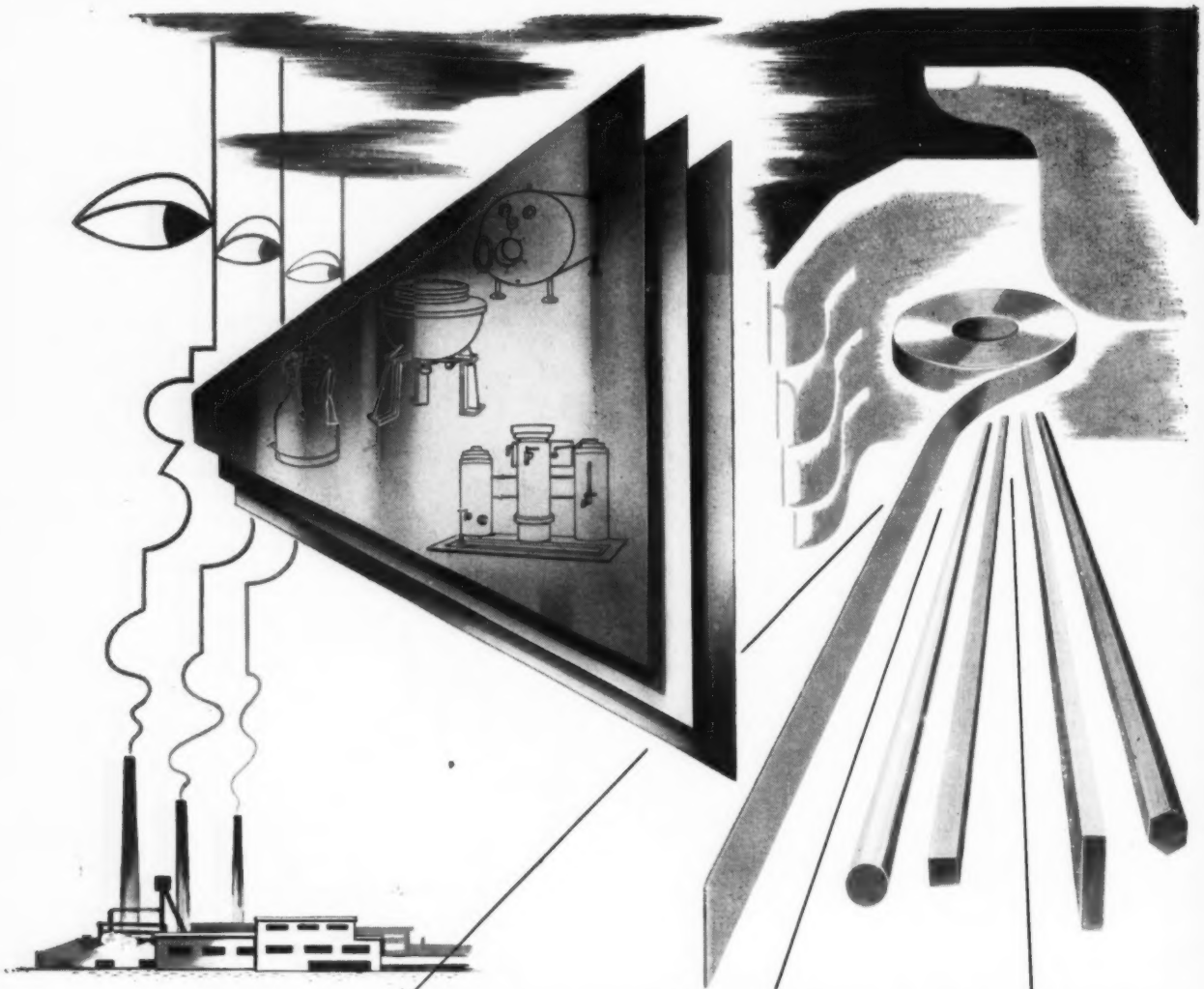

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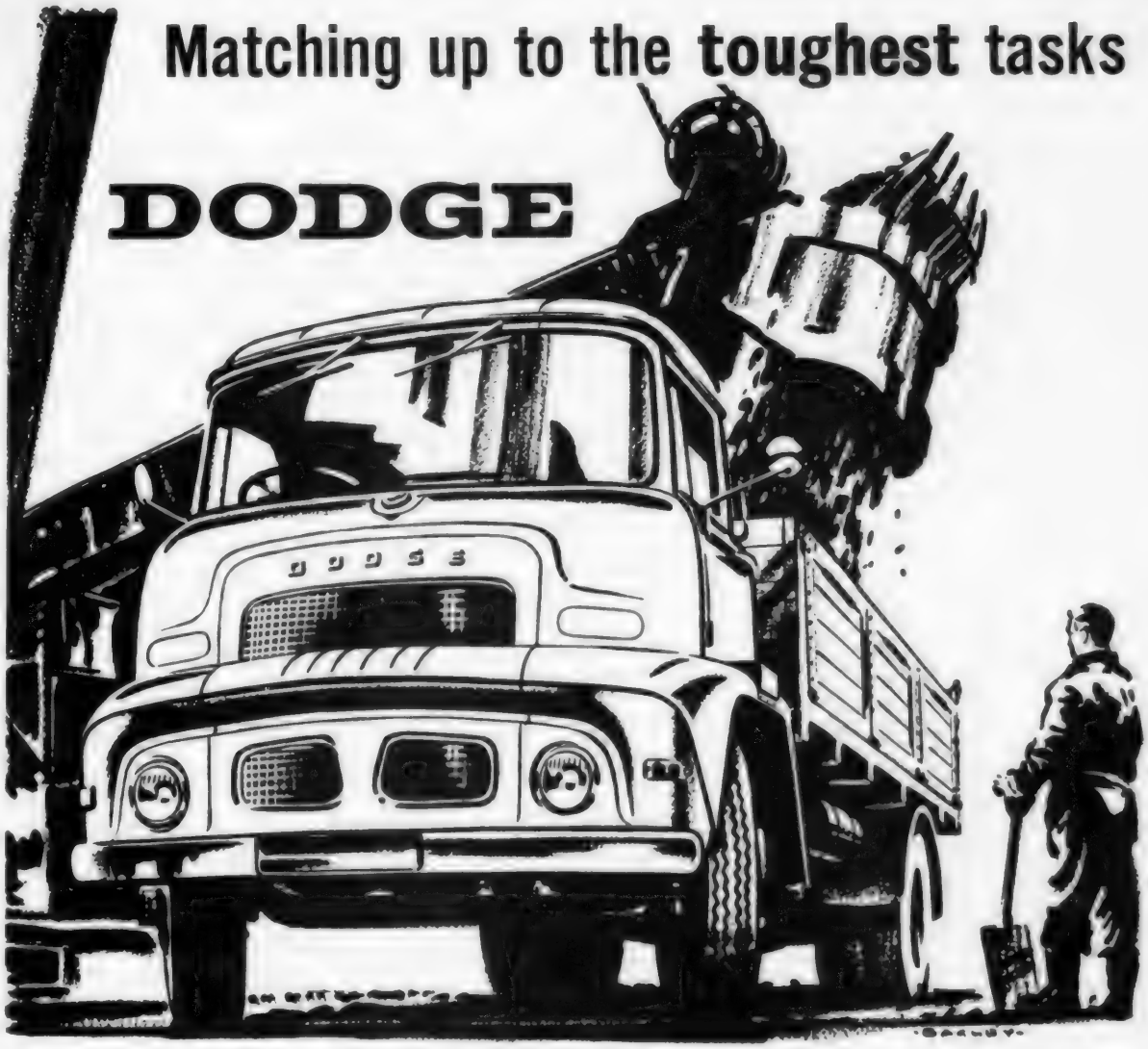

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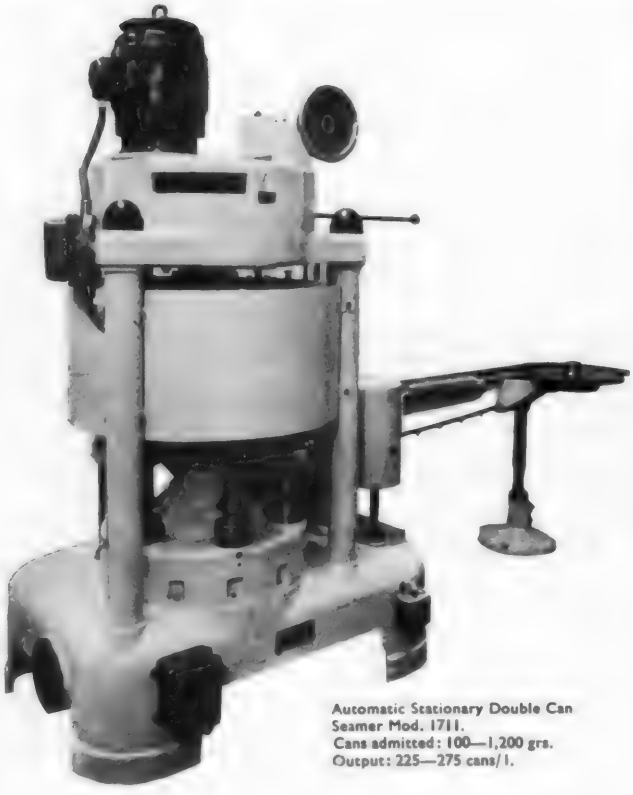

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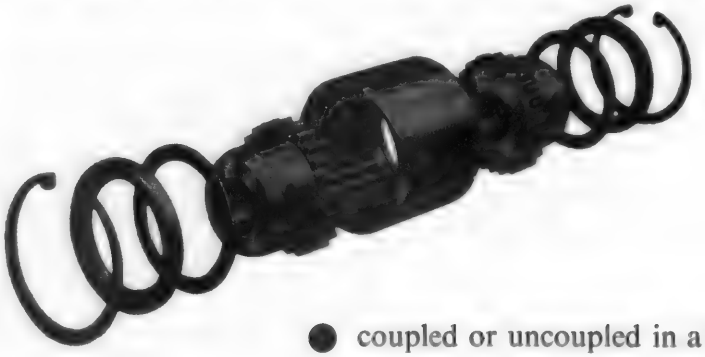

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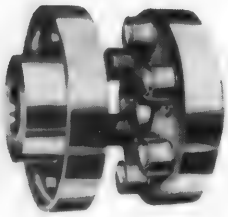

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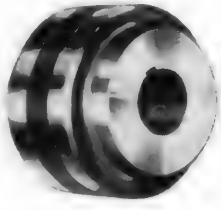

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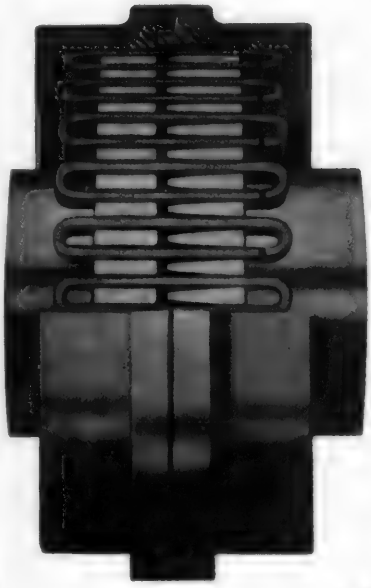

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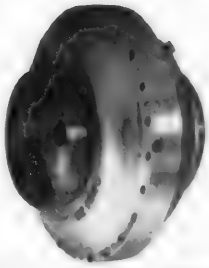

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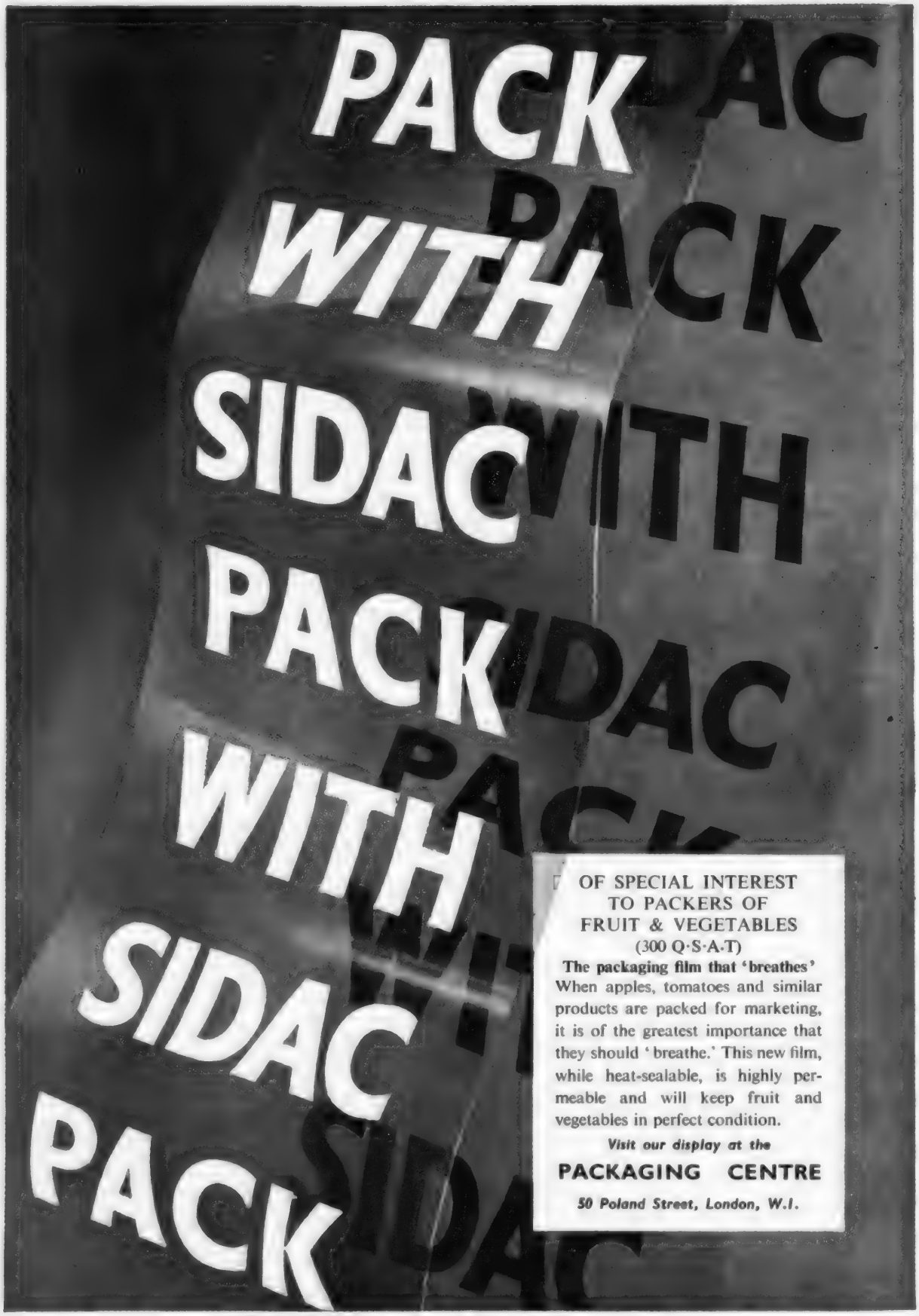
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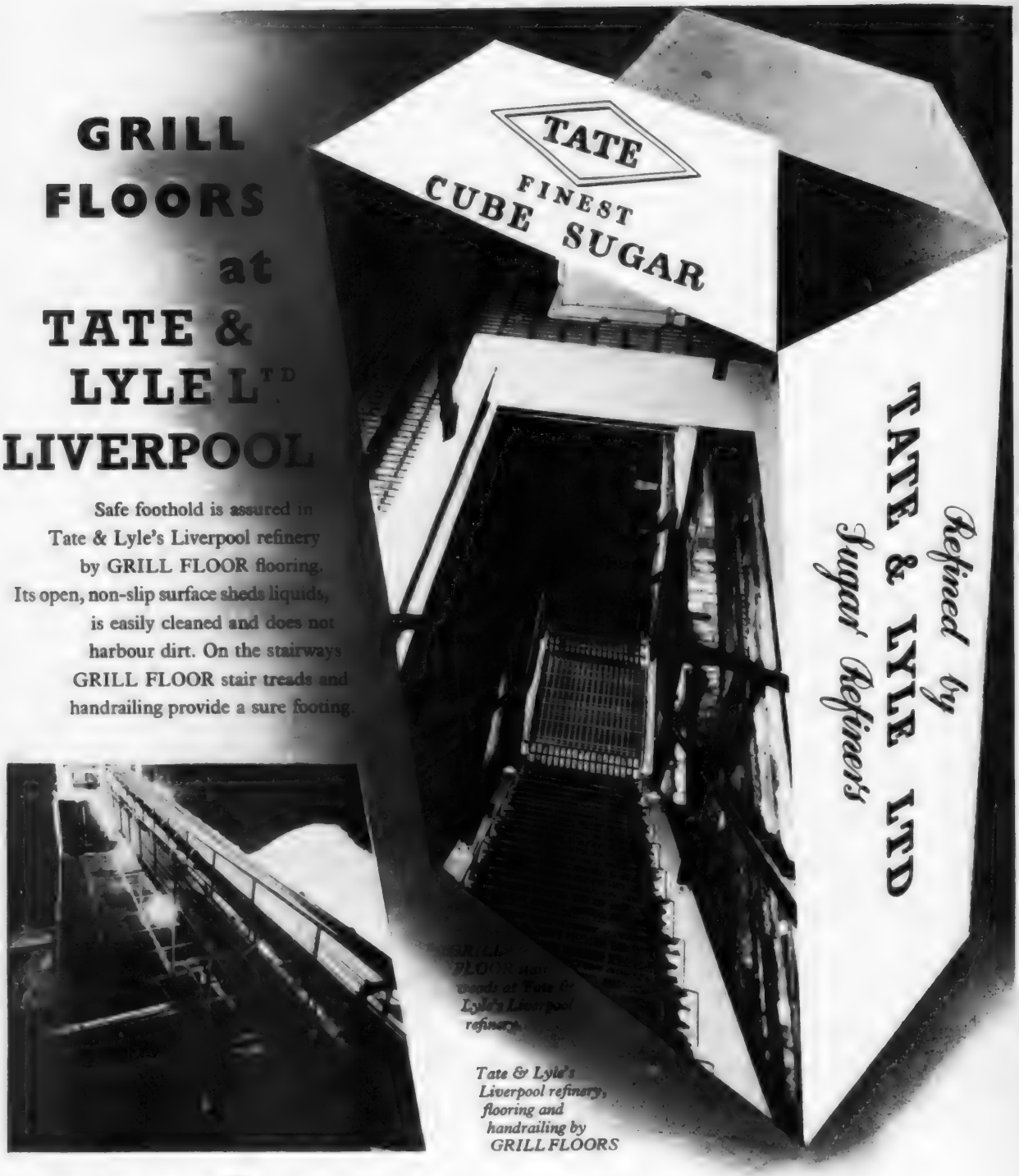

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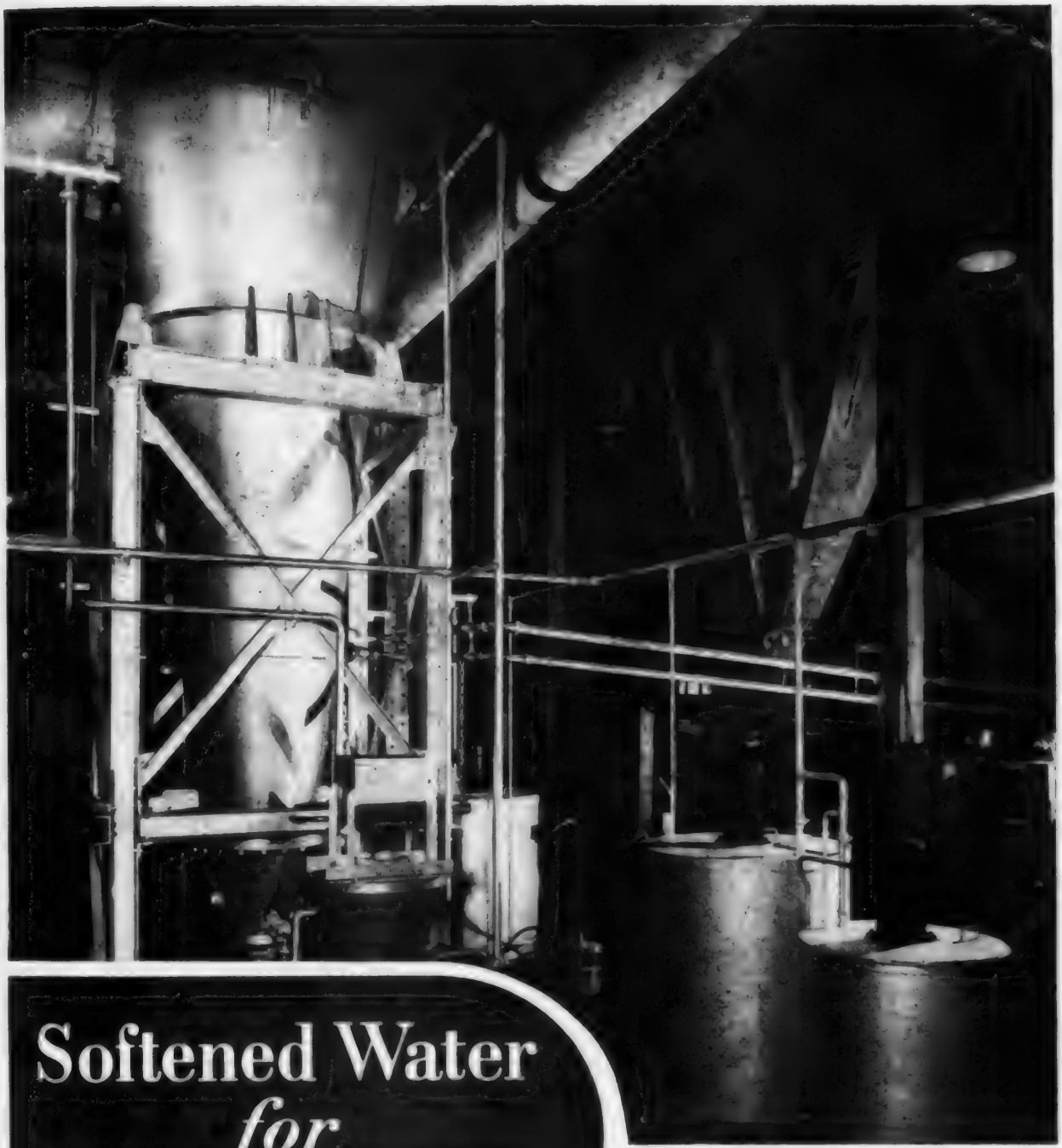

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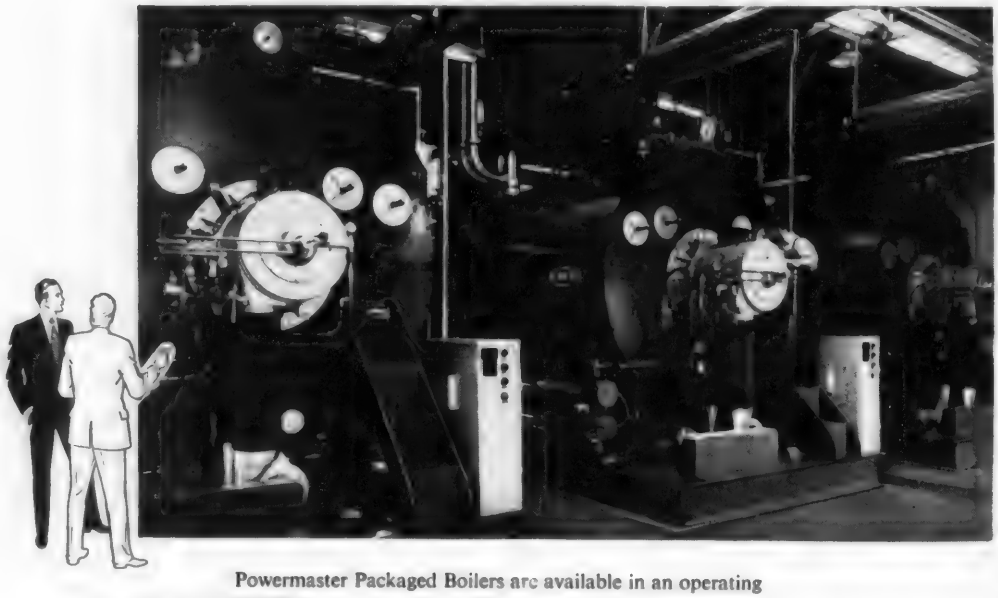

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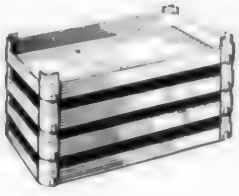

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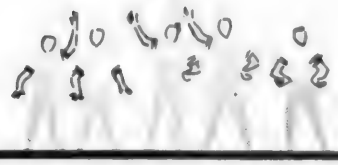

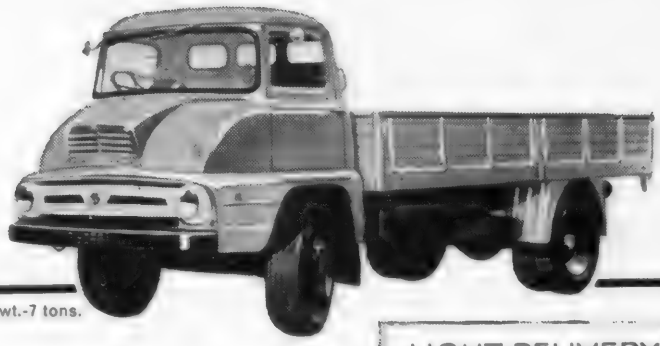

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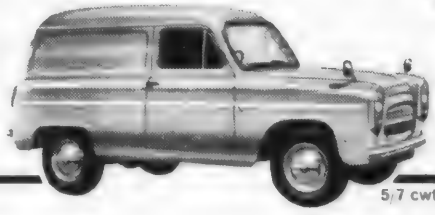

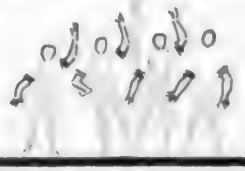

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5/7 cwt. Vans.

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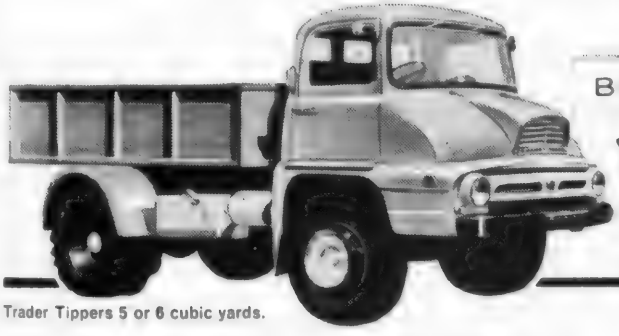
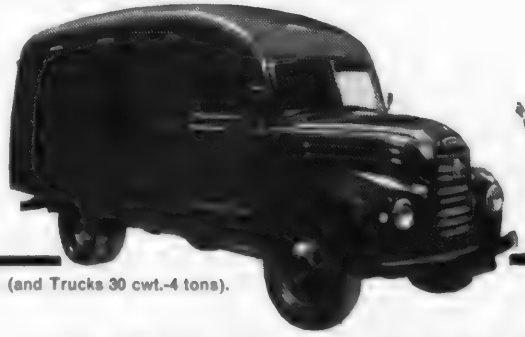


BUILDING

Trader Tippers 5 or 6 cubic yards.

In the long run . . . or the daily round . . . there's nothing to beat a Thames. For more profit-miles per day, the present range of Thames commercial vehicles is the greatest ever. With that strength in reserve, you'll find they meet schedules . . . beat schedules . . . stay on the job longer without cost-inflating delays. It's Thames first time for drivers and operators too; car-styled cabs, superb manoeuvrability, easy accessibility . . . plus Ford Service. For long hauls or local deliveries, there's a smooth-styled Thames to help build *your* business. See them at your Ford Dealers and join the great swing to Thames.

HEAVY DELIVERY



Semi-forward control 2 ton Van (and Trucks 30 cwt.-4 tons).

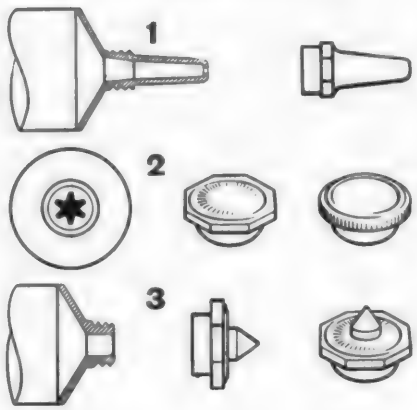
THAMES

There's a THAMES for every trade

TRUCKS & VANS

AND WORLD-WIDE FORD SERVICE TOO!

PUT YOUR FOOD IN TUBES
WITH 'DALE' FEATURES



special nozzles

Customer and consumer demand is catered for in every way. John Dale Limited offer as standard a variety of special nozzles without tool charge for special purposes. Examples are:—

1 The elongated nozzle for piping with icing or jellies.

2 A conventional nozzle with a star shaped orifice for fancy decoration on biscuits, cocktail savouries, cakes, etc.

3 The thin membrane sealed nozzle. This Dale development offers you an Aluminium tube which with its sealed 'Easy-pierce' nozzle is ideally suited to products which must be kept airtight. This nozzle on a tube with one of Dale's special endseals is the perfect pack for any product which is inclined to seep. The nozzle is, of course, easily pierced by means of the spiked cap as illustrated above.

JOHN DALE

'the people'

ENTERPRISE 1272
BURY 5295

The floor tile that never yields
STRIATED
An ideal non-slip paving for intensive use, approach roads and loading yards.
PLANE-SURFACED
A very easily-cleaned paving, recommended for hygienic factory finishes.
Here is the paving for you. Owing to its unique three-point suspension, TRI-PEDAL iron paving ensures a level, low-jointing surface that requires no maintenance and is truly economical.
However heavy the traffic it will not crack or craze.
Unaffected by oils, greases and food acids, TRI-PEDAL is indeed a perfect serviceable flooring.
FOUNDED 1790
TRI-PEDAL
UNIT SYSTEM OF IRON PAVING
THE BUTTERLEY COMPANY LIMITED · RIPLEY · DERBY · ENGLAND

TOP QUALITY . . .

You'll know at once there's something specially good about Golden Glow. It mixes easily, has a churn-fresh taste that no other milk powder has. To make absolutely sure it retains all its natural food values, every Golden Glow product is laboratory tested for 10 days before it is allowed to leave the creamery. Golden Glow really tastes good. It's easy to handle, easy to store and economical to use. Phone or write for a sample today.

Spray and Roller Process; Full Cream Milk Powder; Evaporated Milk and Cream; all packed in containers to suit your requirements.

GOLDEN GLOW

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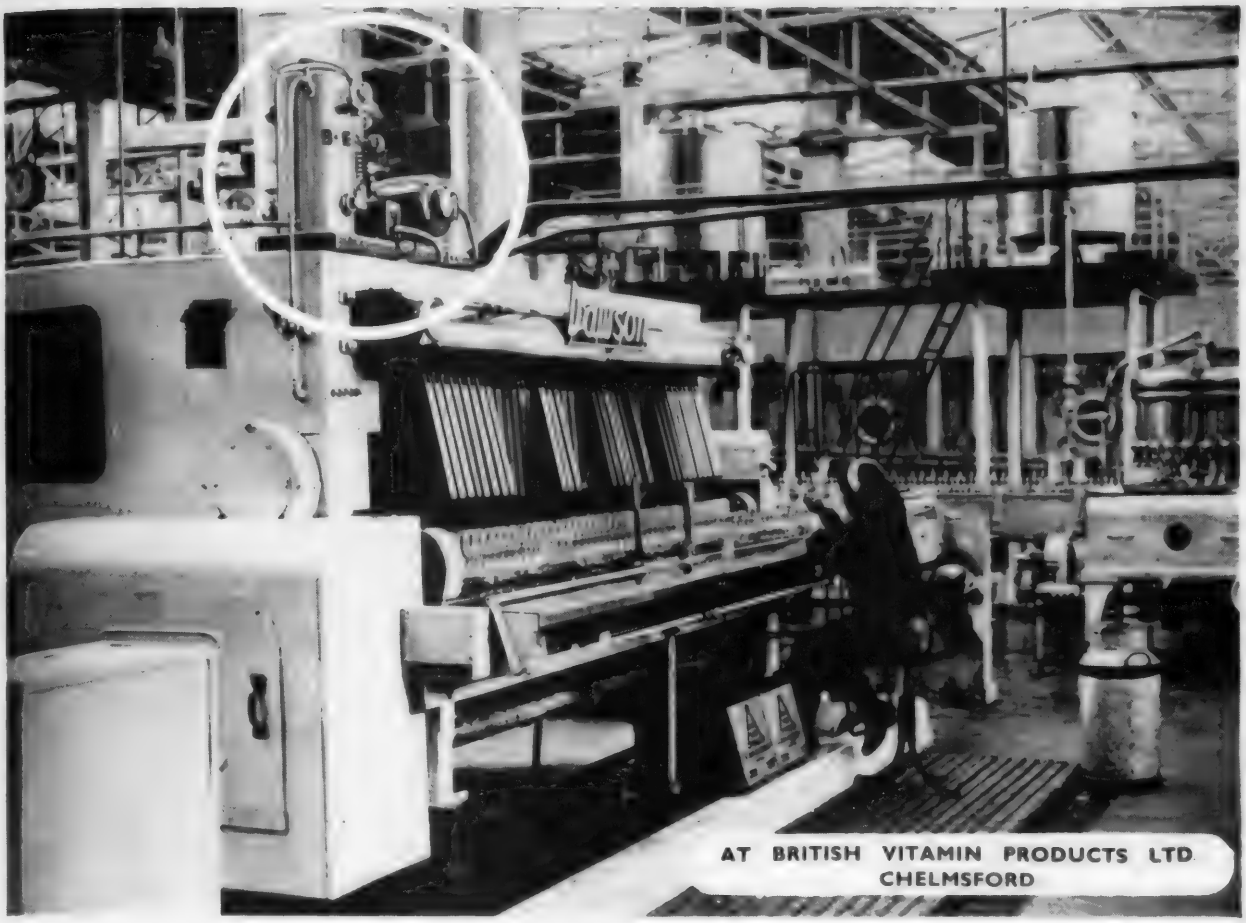
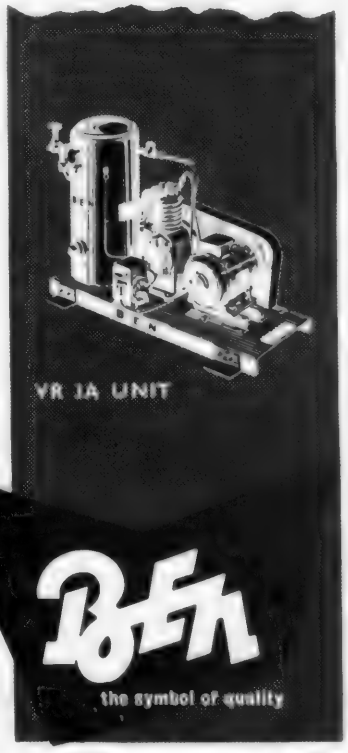


Serving Industry



Many famous names in the British Food Manufacturing Industry select B.E.N. Air Compressors and pneumatic equipment to serve them in the manufacture of their products . . . and the reason? . . . their reputation for reliability and sound performance backed by an efficient after-sales service.

Typical of the many B.E.N. Air Compressors installed in industrial plant throughout this country and overseas are those of British Vitamin Products Ltd., manufacturers of the world-famous BRITVIC fruit juices.

These compressors provide air for operating clutch, pump and control mechanisms on their Hydro Bottle Washing Units. Our illustration shows one of these impressive machines on which is mounted a B.E.N. Model VR3A Automatic Unit.

For over 30 years the B.E.N. organisation has been serving industry with compressed air equipment and this long experience is available to all without obligation.

COMPRESSED AIR ENGINEERS

B.E.N. PATENTS LTD. (Division of Broom & Wade Ltd.)

Dept. F.3. HIGH WYCOMBE, BUCKS.

C.P 323

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First Class in **GLASS**

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★ Packed in easily handled cartons

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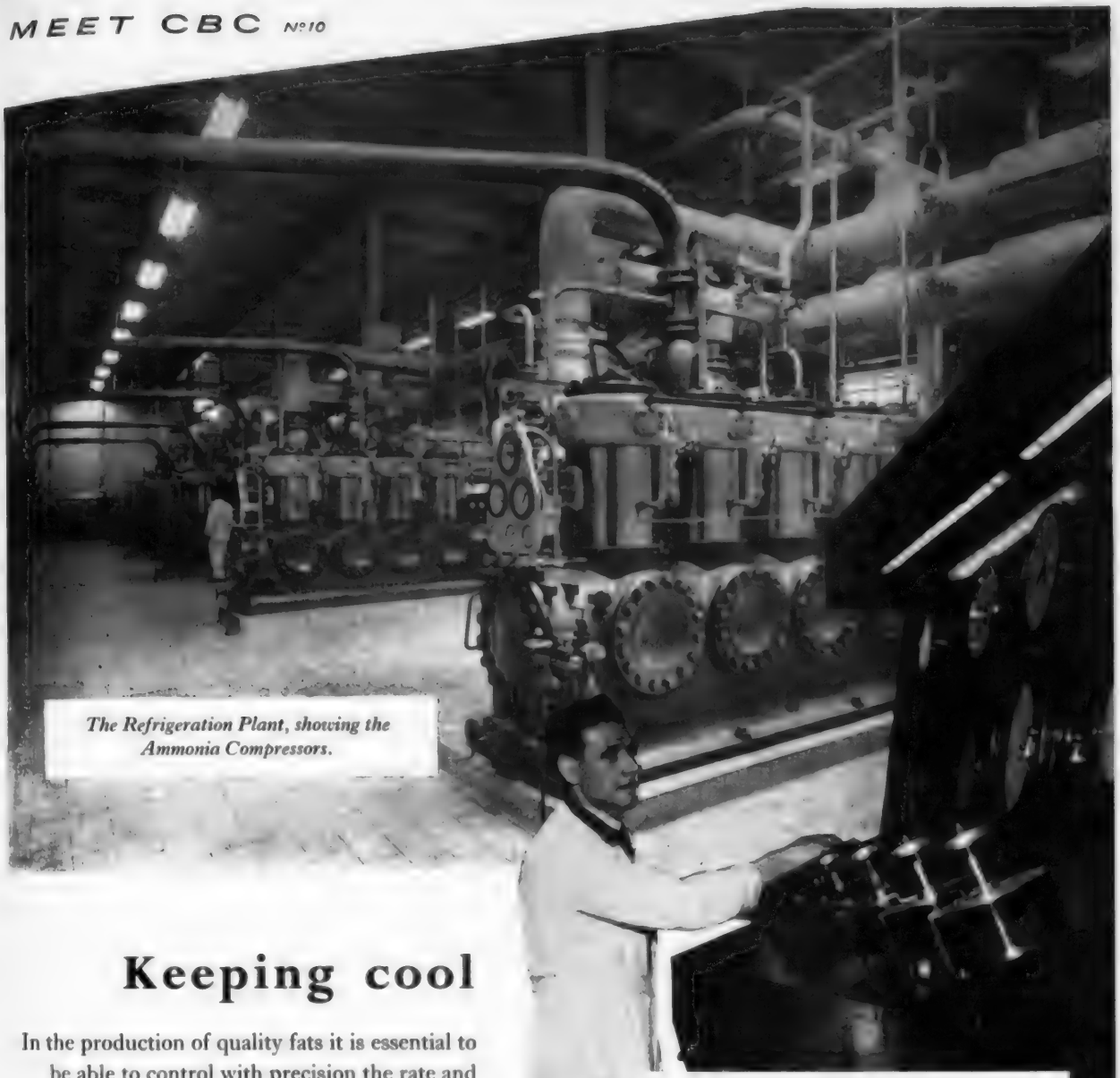
TRADE N MARK

MEET CBC No10



The Refrigeration Plant, showing the Ammonia Compressors.

Keeping cool

In the production of quality fats it is essential to be able to control with precision the rate and depth of chilling of the warm liquid oil blends. Thus, the Bromborough Factory is equipped with a large, modern refrigeration plant which guarantees the maintenance of those chilling conditions which are so vital to the process. With CBC it is a byword that no effort is spared at *any* stage to give their products the colour, texture and keeping qualities so highly valued by the baker.

If you would like to know more about us and our products, please don't hesitate to contact our Sales Director, S. Mackenzie.

whatever you produce . . .

cakes, cake mix, ice cream, biscuits or pastry of any kind, one or more of these CBC quality fats will meet your need:–

MARGARINES
Marvello · Pastrata · Dolphin

SHORTENINGS
Silkit · Golden Cloud

SPECIALITIES
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CRAIGMILLAR & BRITISH CREAMERIES LIMITED
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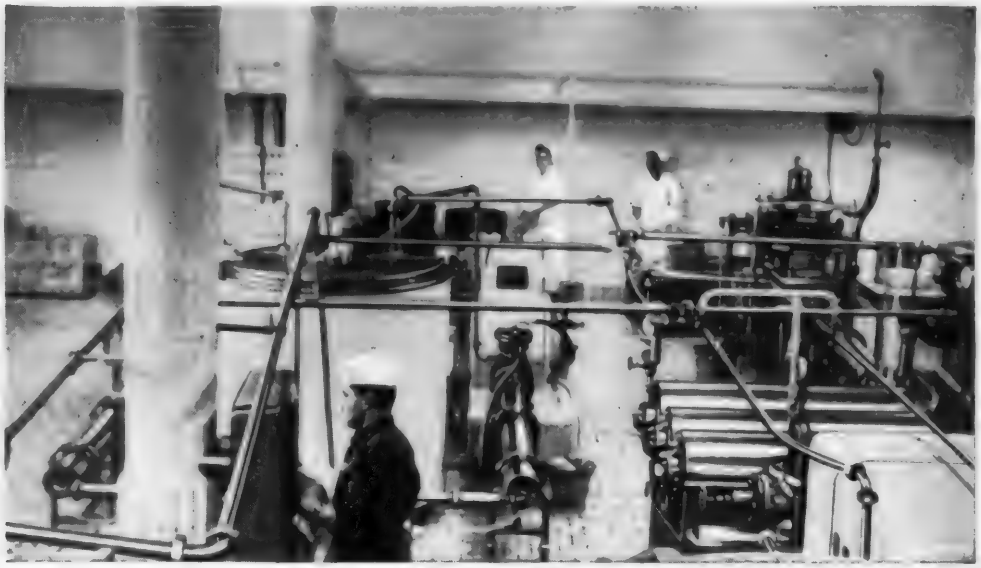
30 YEARS AGO . . .

Girdlers made their first Votator Apparatus which was intended for Ice Cream Freezing!

NOW more than 2,000 VOTATOR Units have been installed all over the world. We in London will shortly be commencing our third century of units. The close team-work and accumulated experience of Girdlers and Johnsons enables us to offer you an unequalled service in all fields where processing of viscous food products is involved.



"Votator" 3-cylinder Margarine and Shortening Processing Unit supplied by us to Messrs. Margariini Oy, Raisio, Finland.

Photographs by courtesy of the Girdler Co. Louisville, Kentucky, U.S.A., and Margariini Oy, Raisio, Finland

★ Votator *continuous* PROCESSING APPARATUS

is being used for automatic production of **Margarine, Lard, Marshmallow, Soups, Sauces, Gelatine, Turkish Delight, Starch Jelly, Biscuit Cream** and many other well known foods and sweets. The product in its final state is superior in texture and flavour. Write for our illustrated literature.

★ *"Votator" is a trade mark which applies only to the products of the Girdler Co. or their licensees.*

PILOT PLANT SERVICE. Ask for the service of our Process Engineers and fully equipped Votator Laboratory for developing new applications or improving existing ones for continuous heating, cooling, crystallising, etc., of viscous or liquid materials by closed processing plant.

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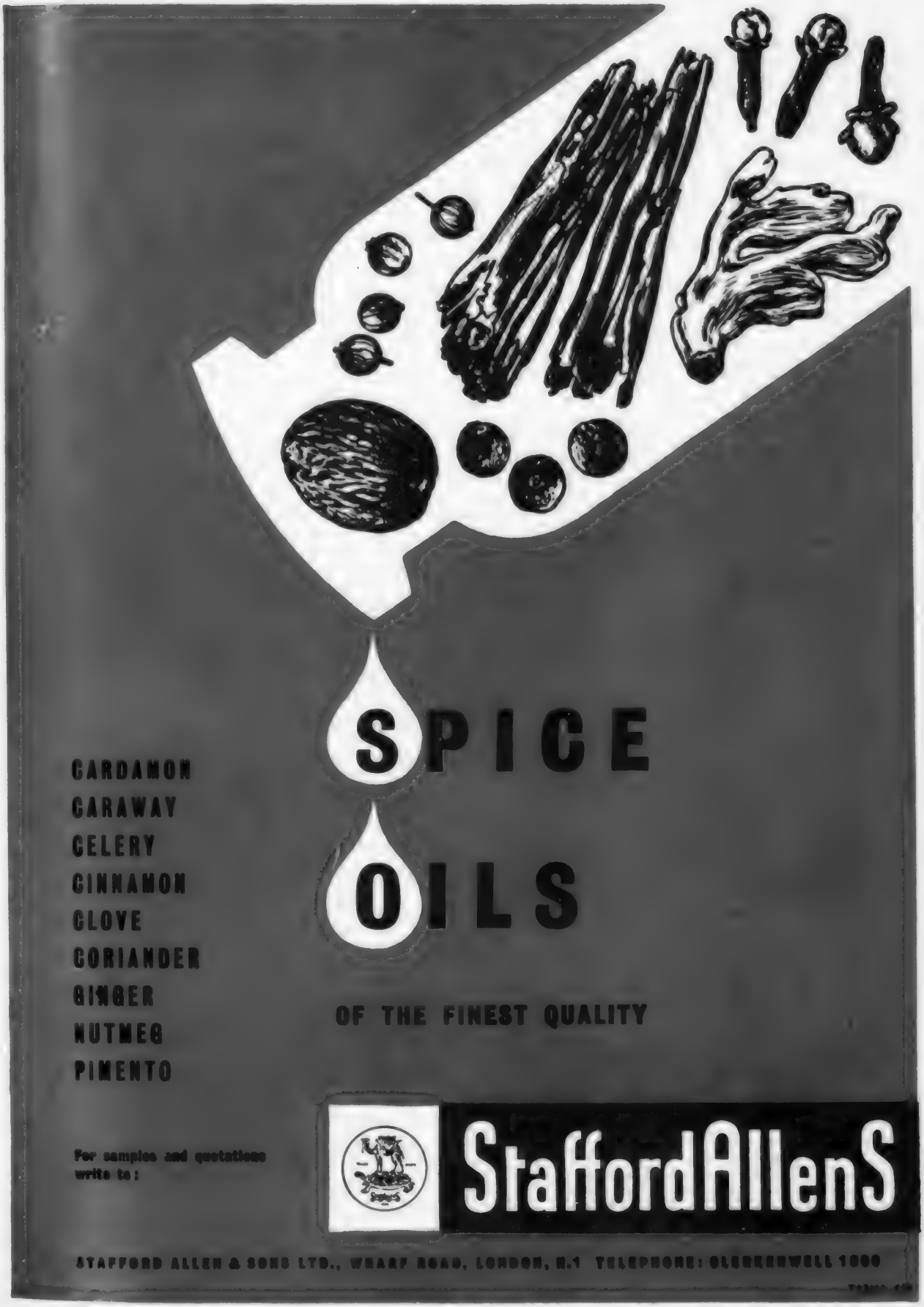
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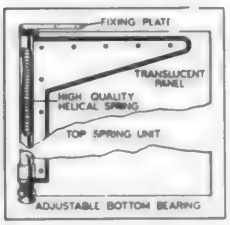
What is a door?

The dictionary defines a door as "a barrier at the entrance to a room or building". Every building has a door, and each door has its problems. In factories, hospitals, warehouses and offices, in fact wherever there are doorways constantly used by traffic, there is need for a door that will eliminate accidents and withstand damage. Neway Translucent Doors do just this. The doors are fitted with plastic panels which allow objects on the other side to be seen in shaded form whilst still retaining privacy. The panels are flexible and yet close tight enough to seal out draughts and noise. Smart, easily cleaned, and self-closing, they absorb shock and blows from passing traffic without damage either to the traffic or to themselves. Neway Translucent Doors are available in sizes up to 8′ × 6′ per pair, and can be installed in existing frames. Once fitted little or no maintenance is ever needed.



The framework of the door consists of a vertical tube which fits close to the door frame. Concealed in the top of the tube is the patented double action return spring—this is fully adjustable and ensures that the door is self closing. The door pivots at the top and bottom on axles let into the lintel and into the floor.

NEWAY

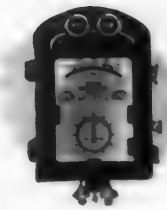
Translucent Doors

✱ *Write now for free leaflet giving full information about Neway Translucent and Rubber Doors*

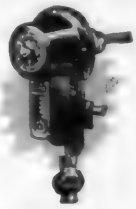
WILLIAM NEWMAN & SONS LTD. (Dept. TC 1) HOSPITAL STREET, BIRMINGHAM 19

CALL IN DRAYTON*

Drayton "Dial Set regulators controlling McKinnon cooking retorts at Beecham Foods Ltd.



Air operated controllers with or without recording feature.



Air or water operated controllers; expansion stem type.

On-off electric control. Available with a wide range of thermostatic switches.

Self-operated controllers, for calorifiers, tanks, etc.

Proportioning electric control with electrical or capillary tube transmission.

"It seems strange to hear so much emphasis on automation and automatic factories capable of producing goods with little or no human intervention . . . when in many factories one would be hard put to find a simple Recorder of any type. . . . There is probably still no more fertile ground for the application of instruments and automatic Control. Even with the best will in the world, the finest engineer cannot get the best ultimate results without instrumentation."

From a paper by R. Clare, B.Sc. of N.I.F.E.S.

It is for the thousand and one processing and heat treatment applications that the extensive range of Drayton Automatic Controls is so particularly valuable. The outstanding feature is that each and every regulator is essentially *right* for its specific job . . . sound in principle and design, accurate and reliable in performance, never too elaborate for the requirements. Correct selection of control equipment is the important thing. We can advise on this from the widest experience of applying automatic control to most industrial heat processes.

*and get things under control

AC 29 F2

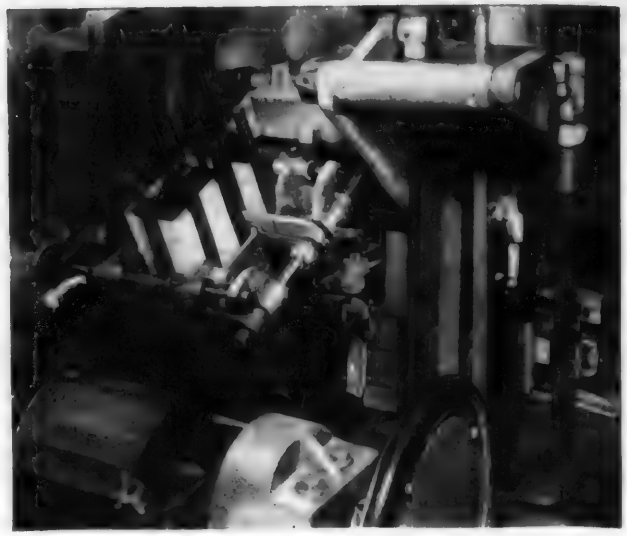
Write to Dept. F.M.

The Drayton Regulator & Instrument Co. Ltd., West Drayton, Middlesex. *Tel.: West Drayton 4012*

"UNIMATIC"
Fully automatic labelling machine

Single or multiple labels can be applied to round, oval, flat, square or polygonal containers, the labels being gummed all over to ensure perfect adhesion. Output depends on type of work, speeds up to 65 per minute with body labelling and up to 60 per minute with body and all-round-neck labelling.

Other types of labelling machine from Bench labellers to machines that will apply labels both back and front.



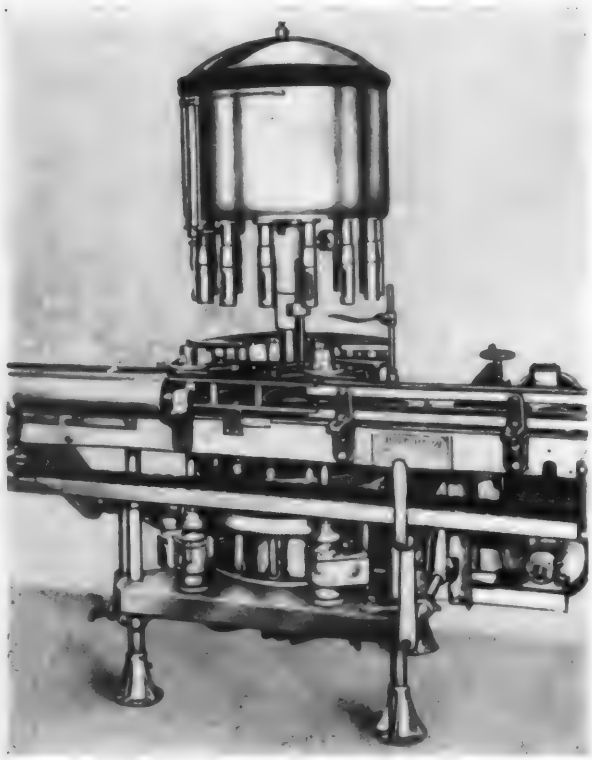
This "UNIMATIC" at one of the Crosse & Blackwell Factories is applying both body and neck label simultaneously, to the famous "BRANSTON SAUCE" bottle. The double label magazine and "gripfingers" holding label to bottle, can be clearly seen.

Use PURDEX GUM in all your Labelling Machines.

PURDY MACHINERY CO. LTD.

41-42 PRESCOT STREET, LONDON, E.1
ROYAL 8401

FARROW & JACKSON LTD.

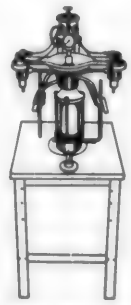


F&J

Sole selling Agents for

"HORIX"

Famous throughout the U.S.A.

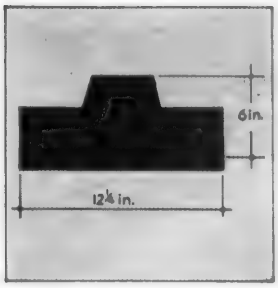


The one filling machine with four heads in pairs, worked by two operators. Gives high output in small space. Automatic overflow return.

The "HORIX" range of filling machines includes fully and semi-automatic machines, the latter being easily changed to fully-automatic. Employing the "HORIX" gravity filling system they will handle virtually any still liquids or semi-liquids. Change over for varying sized containers is also quick and easy.

Also Available: Conveyors, Accumulation Tables, Label Coding Machines, Label Gumming Machines, etc.

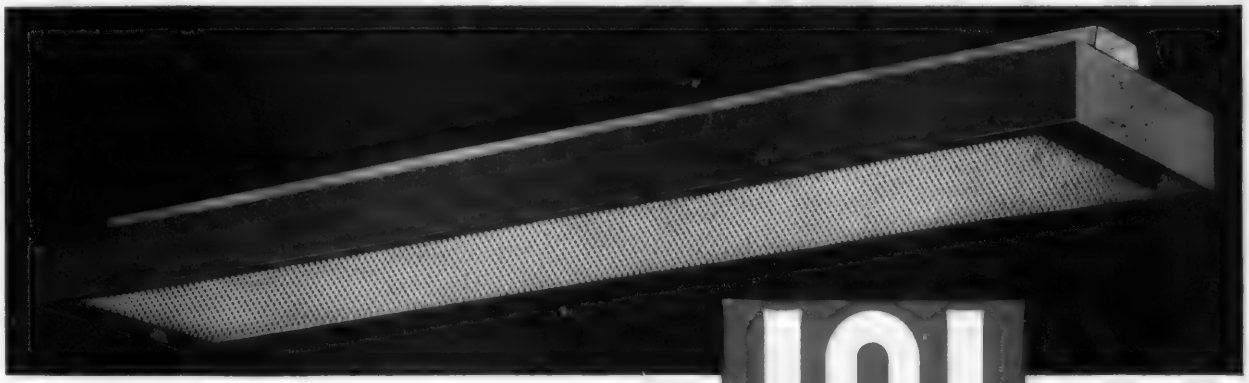
JACW/FM/1



one of many decorative designs

The brilliantly successful G.E.C. 101 range of fluorescent fittings offers a wide choice of designs for every lighting requirement — in executive offices, showrooms, shops and stores, as well as factory areas. They are made for 1½ to 8 ft. single or twin Osram guaranteed tubes, and all employ the famous G.E.C. Basic Channel with its proven advantages of versatility and economy in installation and maintenance.

The fitting illustrated, F41142/3, is stoved enamelled blue/grey and the glass gives a substantial measure of control of the downward light.

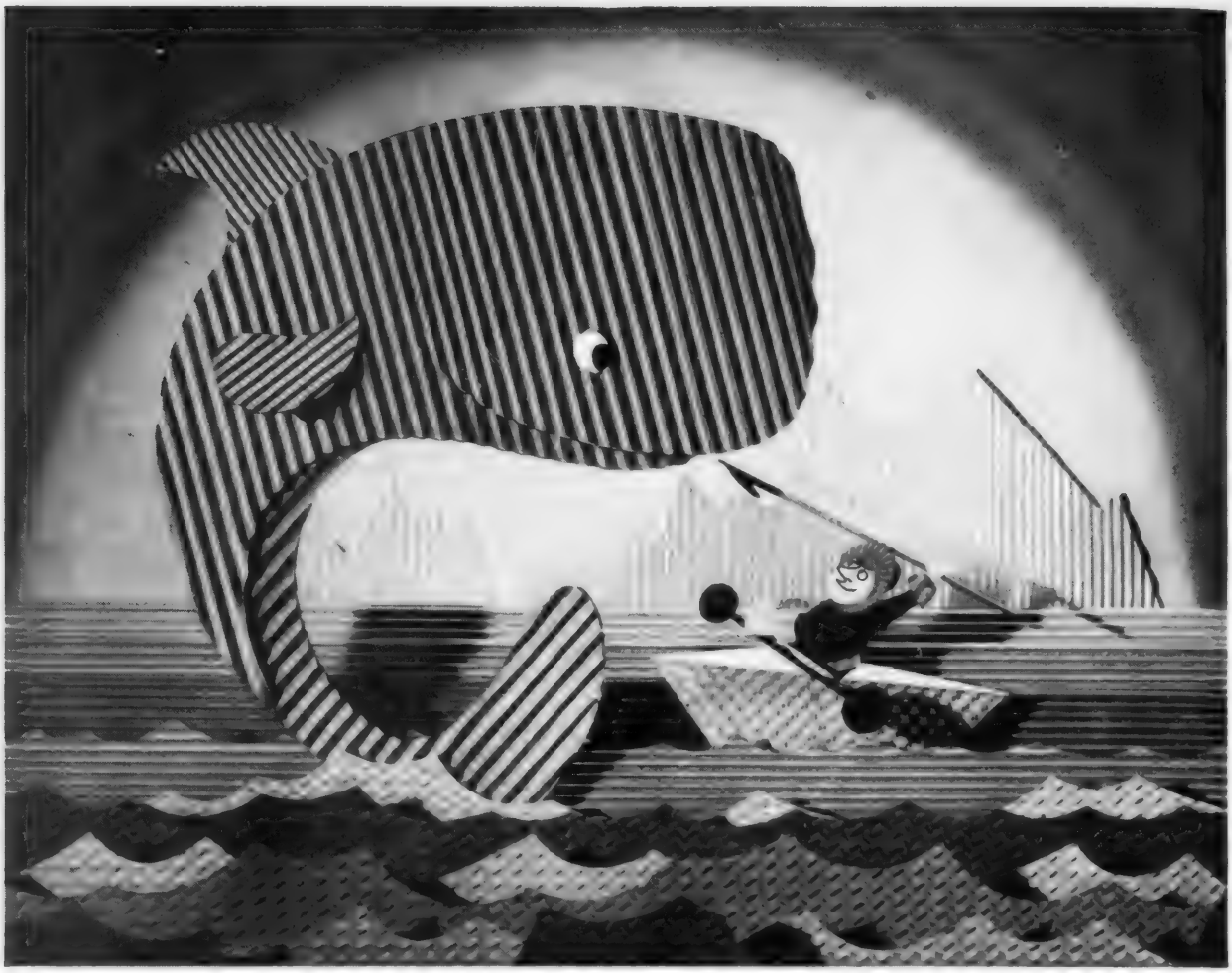


101 range

fluorescent lighting fittings

G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



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No detail is too small to receive our fullest attention – conversely, no packaging proposition is too big for our capacity. As part of the comprehensive Reed packaging service we pride ourselves on offering unique benefits to our customers. Because eight Reed factories 'on permanent call' can carry out the largest assignments with swift efficiency.

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Salt users
—this is no pipe dream

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I.C.I. will gladly send you their free booklet 'Salt by Pipeline', which gives full details of this trouble-free hygienic method. If you use salt to make brine for preserving meat or vegetables or indeed for any other purpose it's really worth thinking about —I.C.I. is offering you the most economical and efficient method of buying Pure Dried Vacuum Salt.

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THE HEART OF THE MATTER

Plenty positive displacement pumps are suitable for almost all food and chemical processes. They can be supplied with fixed or variable and reversible capacity; and with Servo or automatic control. Illustrated is a special pump designed to the Milk Marketing Board's requirements. Fitted with a mechanical seal, this pump can be completely dismantled for thorough sterilizing in less than a minute without any tools. It is as easily and quickly reassembled.

PLENTY & SON Ltd.

NEWBURY, BERKS

TELEPHONE: NEWBURY 2363 (4 lines)
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"... a dragon gules on two coils of sheet steel proper..."

THE Norman-English description of the emblem of The Steel Company of Wales Limited is couched in the language of an age when "product identification" was, quite literally, a matter of life or death. Coats of arms were invented to distinguish friend from foe in battle.

In modern business, product identification is also a matter of life or death. Customers may intend to buy your product; but if they can't recognize it, the chances are they'll buy your competitors'. You naturally rely on your pack to guide their preference your way. Have you ever thought of the great advantages tinplate can give you in product identification?

NEW COLOURFUL PACKS

Tinplate can take 4-colour printing in reproduction equivalent to that on the finest art-paper. If you print your product's emblem on tinplate it will stand out because of its accuracy and its vividness.

You can design beautiful new, colourful packs; and their brilliance will be faithfully portrayed on tinplate. For unmistakable, hard-hitting product identification, tinplate is unsurpassed.

All this is another "plus," added to the established advantages of tinplate as the leading packaging material. Tinplate, being made of sheet steel, gives a product permanent protection in any climate; it is almost infinitely adaptable; and tinplate packs are easy and economical to store and handle.

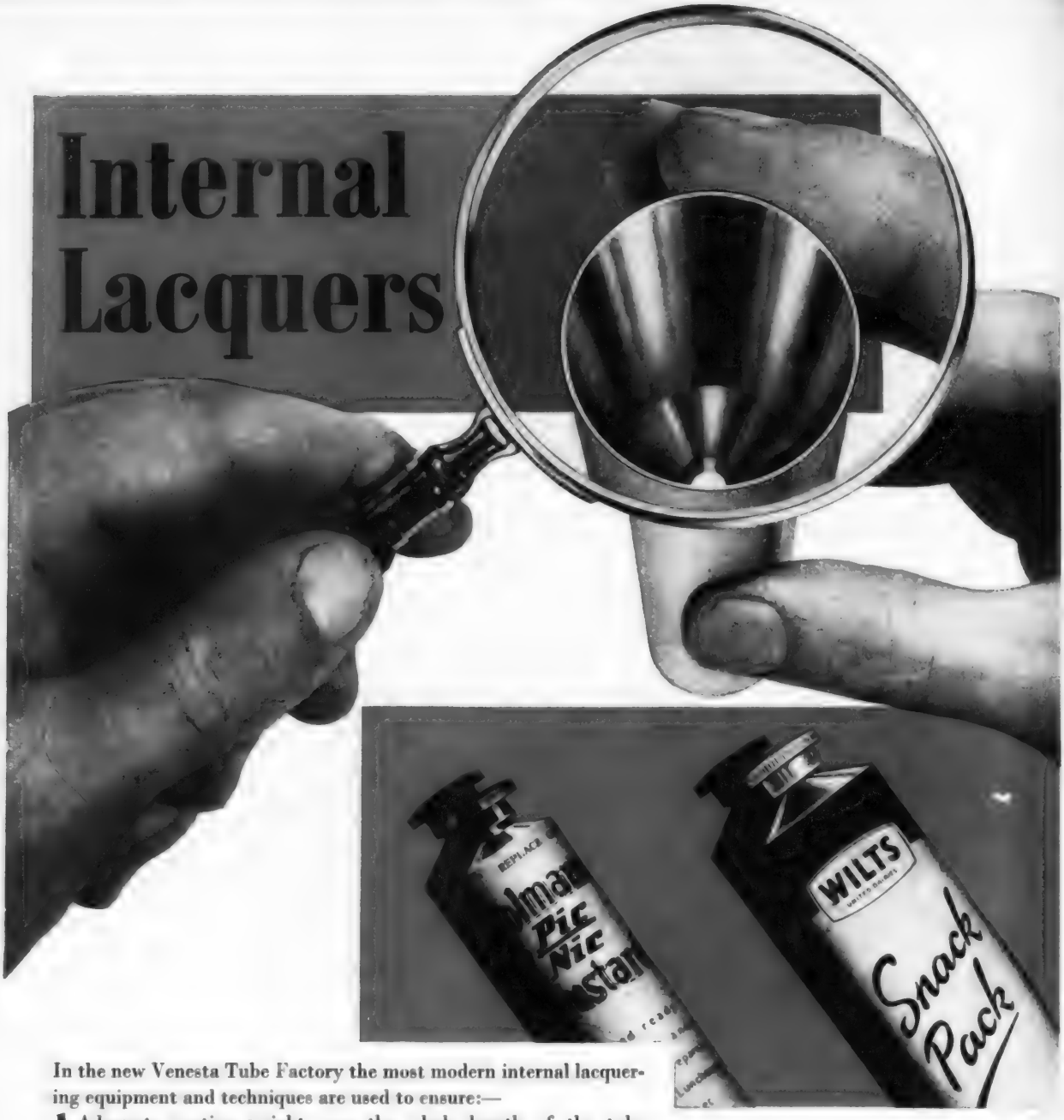
If you have a packaging problem it will be well worth your while to seek the advice of The Steel Company of Wales Limited. The Company prides itself on giving individual attention to its customers' individual needs. Our specialists will give you most willing help.

THE STEEL COMPANY OF WALES LIMITED

Tinplate Division: CARMARTHEN ROAD, SWANSEA, GLAMORGAN

Telephone: Swansea 51571 Telegrams: Welshplate, Swansea

Internal Lacquers



In the new Venesta Tube Factory the most modern internal lacquering equipment and techniques are used to ensure:—

1 Adequate coating weight over the whole length of the tube including the nozzle interior.

2 Continuity of coating to avoid danger of exposed metal.

3 Adhesion to the tube walls and maximum flexibility to prevent cracking and flaking during use.

A comprehensive Laboratory service is available to test customers' products and determine the most suitable type of internal lacquer, should it be required.

Consistently good

Venesta *tubes*

VENESTA

A product of the Venesta Foil Division

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PROGALLIN P. Foodstuff Grade (Propyl Gallate)

PROGALLIN O. Foodstuff Grade (Octyl Gallate)

PROGALLIN LA. Foodstuff Grade (Dodecyl Gallate)

NIPANTIOX 1-F (Butylated Hydroxy Anisole)

NIPANOX LA-BHA. (a mixture of PROGALLIN LA and Butylated Hydroxy Anisole)

antioxidants

The personal service of NIPA LABORATORIES LTD. ensures using the proper PROGALLIN or NIPANOX combination to give maximum protection to your products.

Knowing the correct antioxidant may be regarded as a science, and NIPA LABORATORIES LTD. have been practising this daily since 1939.

Our technical Staff is at your disposal without any obligation at all, to assist in selecting the most suitable antioxidant, or combination for your product or process.

Write or telephone, when we will get to work helping to solve your rancidity and stability problems.

NIPA LABORATORIES LTD.

Treforest Industrial Estate,
Pontypridd, Glam.

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Roman Wall House, 1 Crutched Friars,
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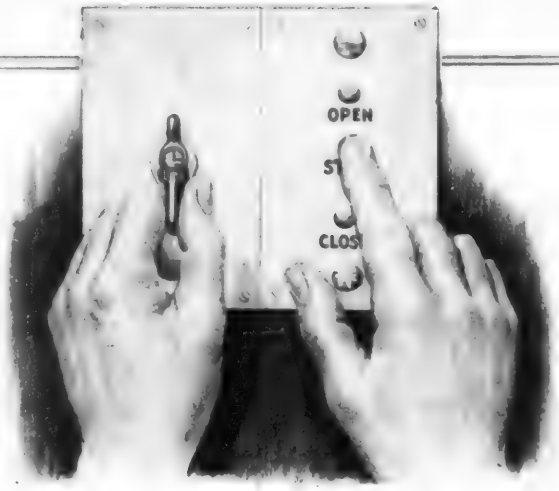

POWER OPERATED

SAUNDERS DIAPHRAGM VALVES

DIAPHRAGM OPERATED
PRESSURE CLOSING

DIAPHRAGM OPERATED
PRESSURE OPENING

PISTON OPERATED

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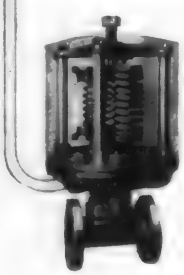

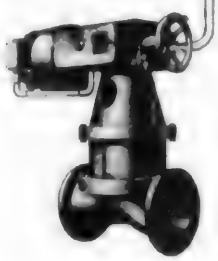

SAUNDERS VALVE COMPANY LIMITED
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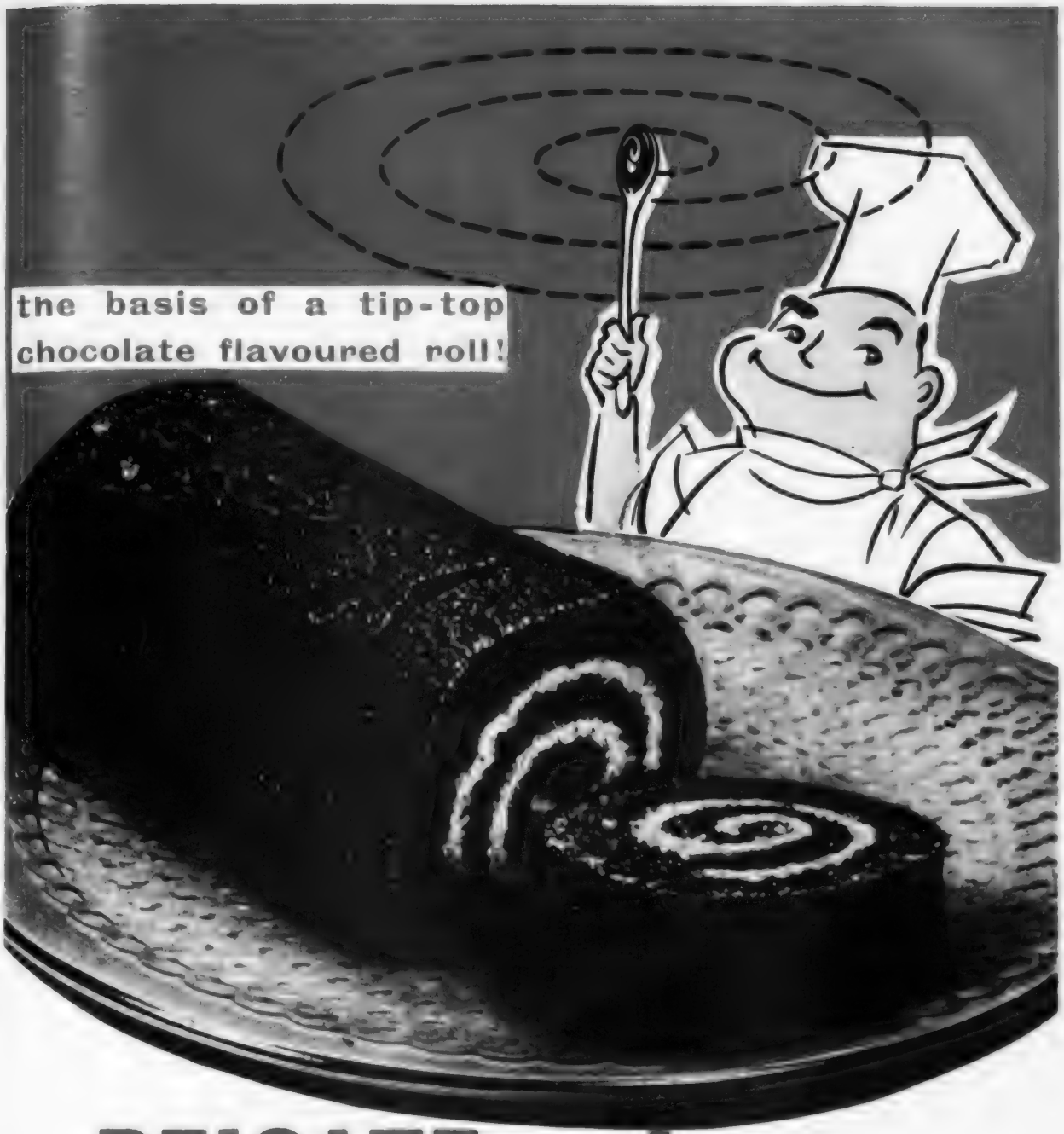

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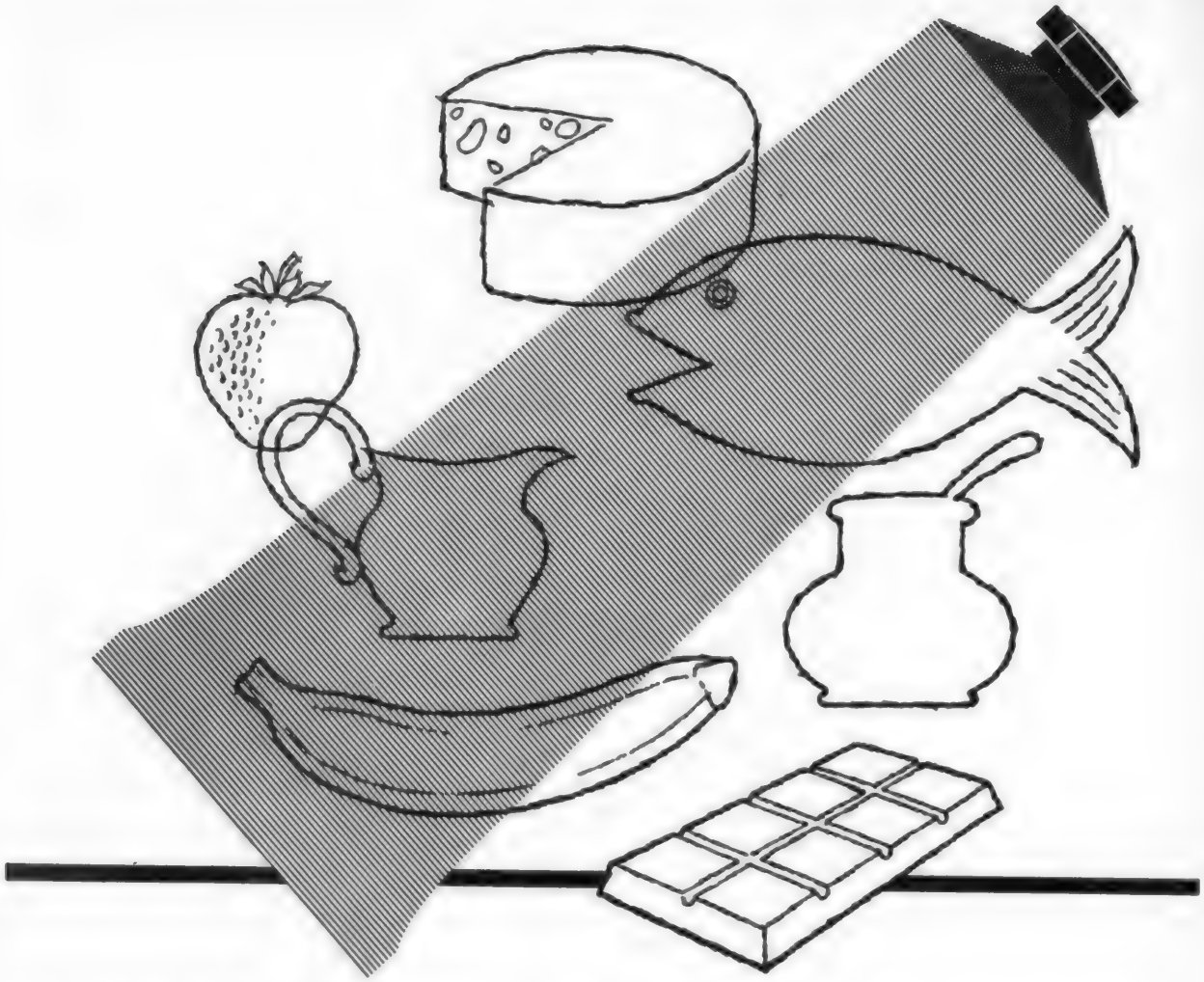

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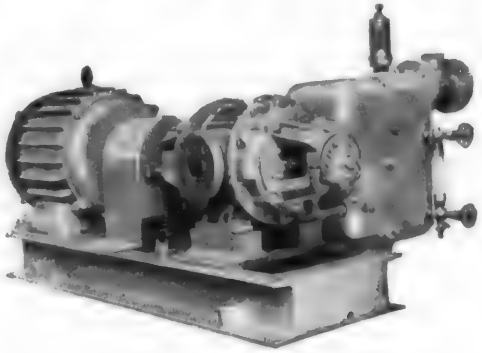

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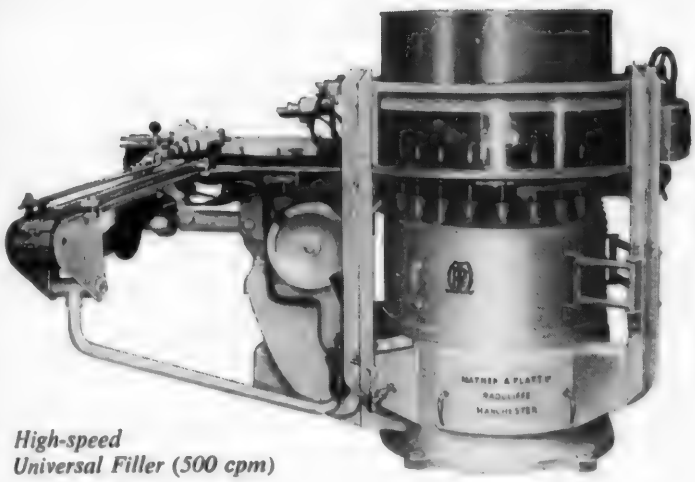

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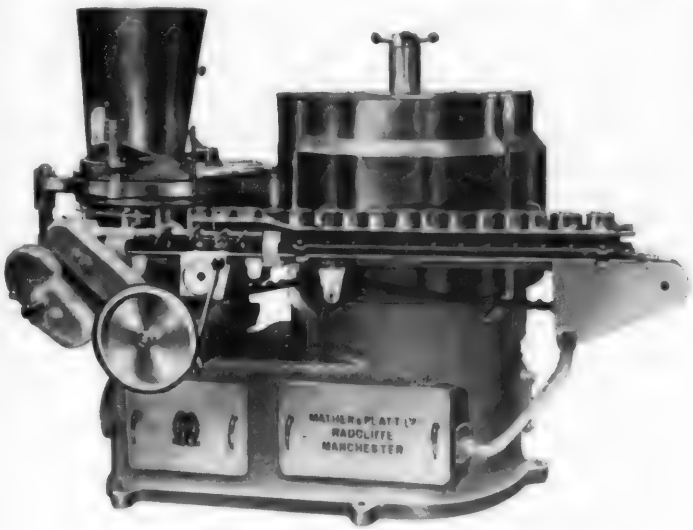

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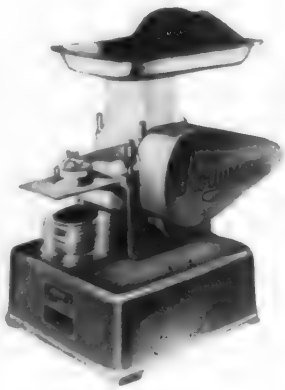

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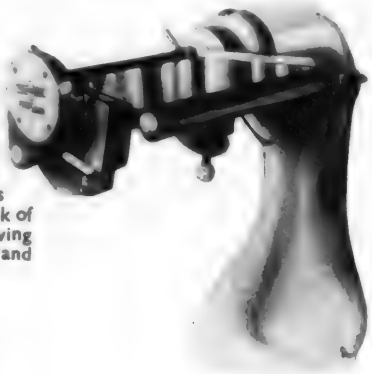

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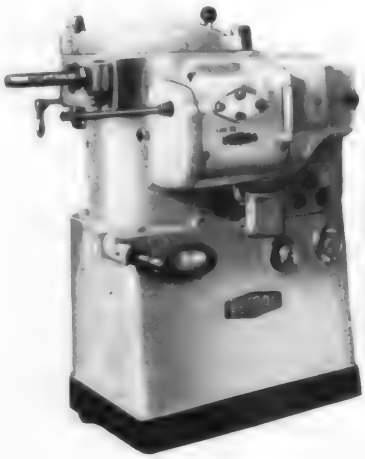

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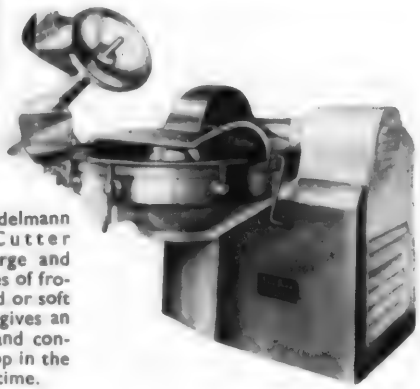

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Induction Heating-1

Electro-magnetic induction was discovered by Faraday and used by him to evolve the electric motor. In some cases, induction can be a nuisance by causing heat losses to arise from induced eddy currents in nearby pieces of metal, but in industry today those heat losses are being turned to good account as a method of metal heating.

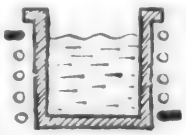
Induction heating produces heat only in the work piece. This is a fascinating and spectacular process which has the additional merit of being extremely effective. An important feature of induction heating is that it gives rapid temperature rise with no time lag, starting being instantaneous. Perhaps its greatest advantages are that it can be used in automatic processes and does not demand skilled labour.

Induction heating can deal efficiently with all the applications outlined below, and including metal melting, preheating and stress relieving, surface hardening, heating of large components, preheating of steel tubes for manipulating, heating for shrinking, for forging and extrusion, as well as for the heating of vessels. There are various methods of applying it, the method to be used being dictated by the application.

Technical details relating to the choice and use of individual types of induction heating will be set out in a subsequent data sheet.

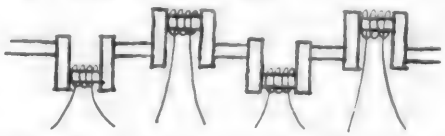
Metal melting

The oldest and largest application of induction heating lies in the melting of metals. The outstanding advantages are: freedom from deleterious gases and products of combustion and other contaminants, rapid speed of melting, low running costs, improved working conditions and reduced metal loss.



Metallurgical processes

This covers a large variety of processes which may be basically divided into surface heating and through heating. Most processes fall into the former category and are used for the purpose of



skin hardening. They include the treatment of such components as: pins, camshafts, crankshafts, rollers, cylinder liners, gear teeth, rocker arms and shafts and valve stems.

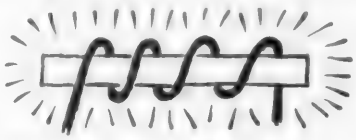
5857

Through Heating

When the current in an induction coil is maintained for a longer period it results in the heat engendered in the work piece penetrating to a greater depth and eventually throughout the piece. It is largely used for the heating of slugs and billets, for upsetting and upset forging, flanging and nosing, shearing and forging and bolt blanks for heading.

Annealing

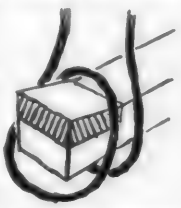
Induction heating is the ideal method of altering the character of metals for a special purpose. Annealing and its related process of tempering, normalising and stress relieving are prominent in



this category. In the case of annealing, one feature of the treatment is that it can be localised, while induction tempering can do in one minute what would require half-an-hour or more with conventional furnace heating.

Brazing, soldering and welding

Brazing and soldering by induction are the quickest and cleanest methods of joining metals together, and it is often beneficial to re-design the parts so that the fullest advantage can be taken of induction heating. Brazing can be used in the case of: carbide inserts for tools, tips for rock drills, parts for universal joints, etc., while the many applications of soldering are well-known. It was not until well into the present century that the age-old craft of welding became a positive aid to greater productivity. Induction welding produces a good, clean weld because oxidation is almost absent.



Miscellaneous Application

Induction heating can be profitably used for a large variety of purposes, including the fusion and hot pressing of powders, heating *in vacuo*, gas determination in metals, fusion of glass, chemical work and many other processes.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association.

Excellent reference books are available on electricity and productivity (8/6 each or 9/- post free)—"Induction and Dielectric Heating" is an example.

E.D.A. also have available on free loan a series of films on the industrial use of electricity. Ask for a catalogue.

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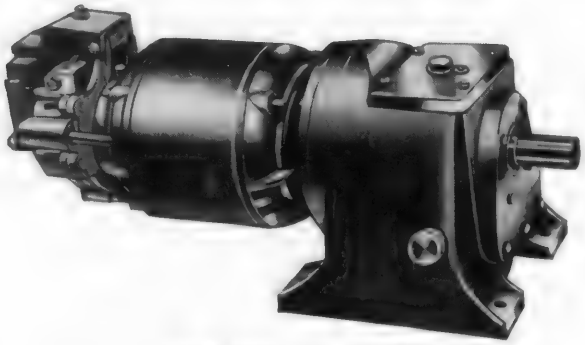

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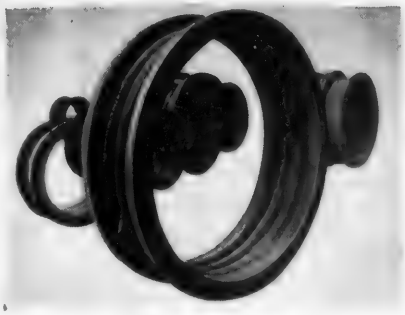

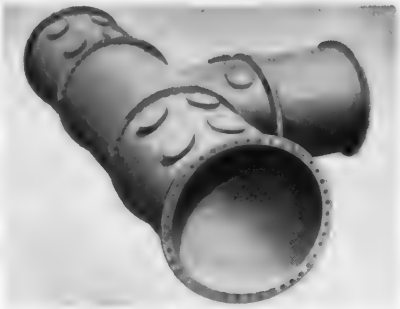

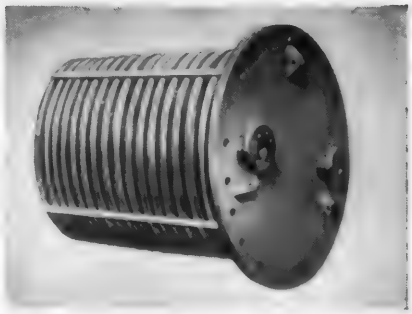

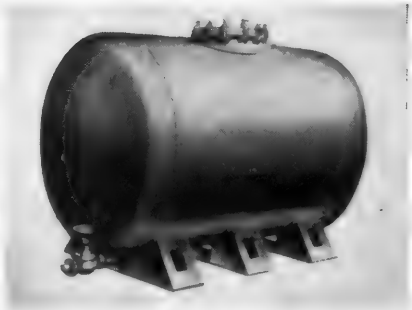

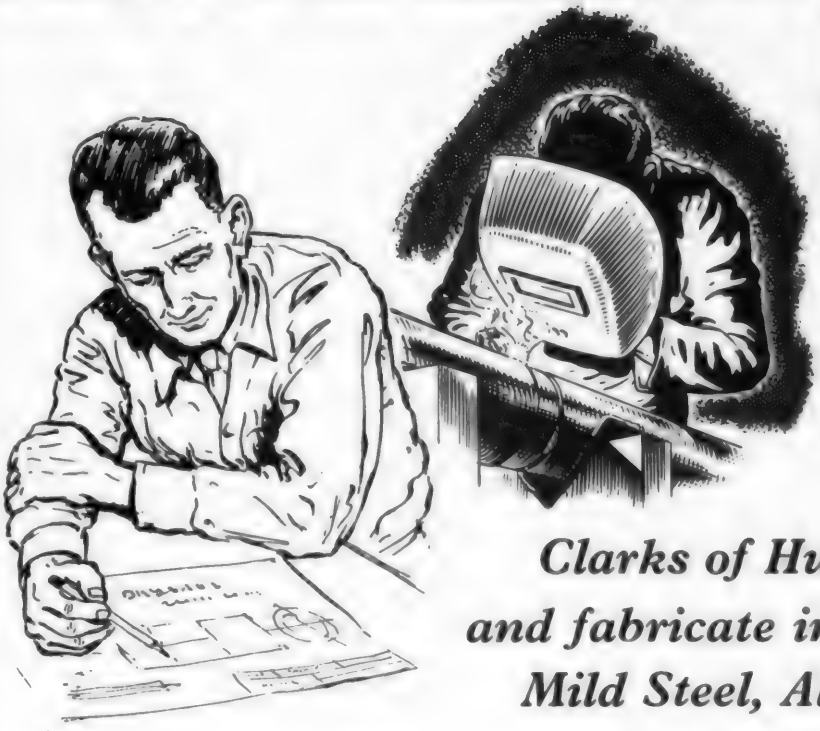

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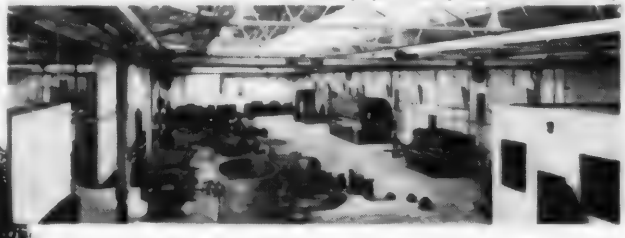

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FOOD MANUFACTURE

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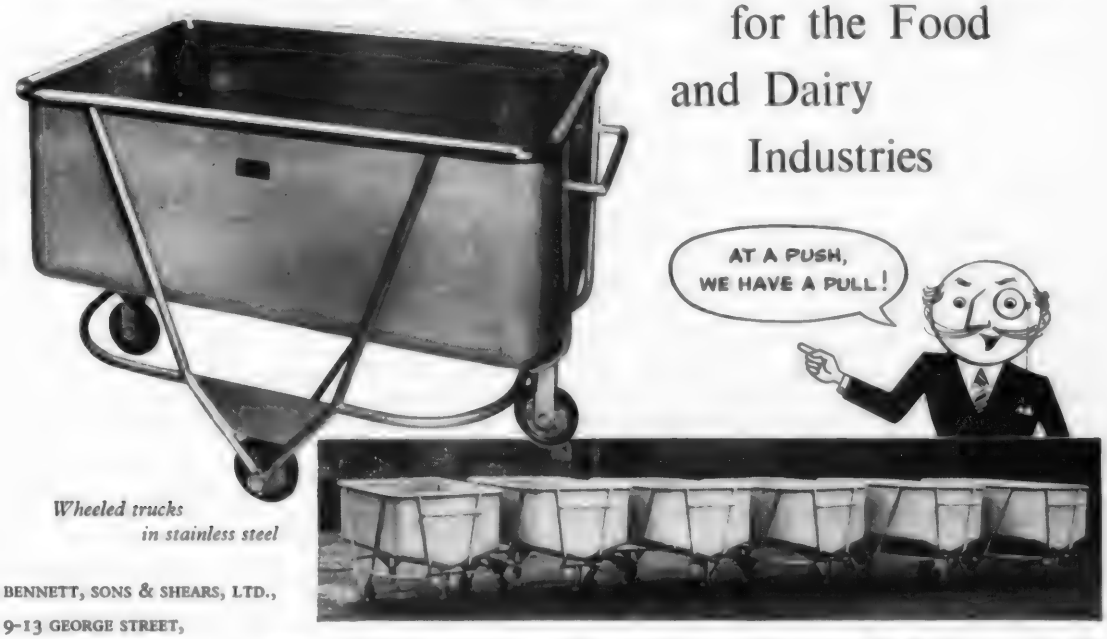

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Number 4 December 1958

The Oil Palm
(No. 2)

LODERS and NUCOLINE LTD.
INFORMATION BULLETIN

Copies of this Bulletin, together with a folder, are available on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

PALM OIL

Refined Palm Oil is a white to pale yellow fat with good keeping properties. It is soft in consistency and melts completely at about 40° C.

Its remarkably simple fatty acid composition is shown below :—

	%
Palmitic Acid	35–40
Stearic Acid	3– 5
Oleic Acid	40–50
Linoleic Acid	5–11

GLYCERIDE COMPOSITION

The glycerides of Palm Oil consist of approximately 10% tri-saturated glycerides, 50% mono-unsaturated glycerides, 30% di-unsaturated glycerides and 10% tri-unsaturated glycerides. The tri-saturated glycerides consist mainly of Tripalmitin, which is not a common feature of natural fats where mixed glycerides are the rule rather than the exception.

This glyceride composition, ranging as it does from tri-unsaturated glycerides through di and mono-unsaturated glycerides to fully saturated ones, gives Refined Palm Oil its soft texture and reasonably long plastic range and makes it satisfactory for so many purposes.

HYDROGENATION

Owing to its relatively high Iodine Value, Palm Oil may be hydrogenated to any desired melting point, usually to between 40/42° C and 46/48° C. Complete hydrogenation gives a melting point of about 58° C. . Hydrogenated Palm Oil is a useful ingredient of fat blends incorporating any desired degree of stiffness ; the consistency of Palm Oil itself may be increased by incorporation of the hydrogenated oil.

PALM KERNEL OIL

In many respects Refined Palm Kernel Oil bears a close resemblance to Coconut Oil. It is a white solid fat, somewhat less brittle than Coconut Oil but with the slightly higher melting point of 28/29° C. Its Iodine Value is higher than that of Coconut Oil, owing to a higher unsaturated fatty acid content.

As can be seen from the fatty acid composition given below, the oil is composed mainly of Glycerides of Lauric and Myristic Acids. The short chain volatile acids are present, but in a lesser quantity than in Coconut Oil.

	%
Caprylic	3·0
Capric	5·5
Lauric	55·0
Myristic	15·5
Palmitic	7·5
Stearic	2·5
Oleic	15·0
Linoleic	1·0

This fatty acid composition accounts for the high Saponification Value and high Reichert and Polenske Values, which are, however, lower than those for Coconut Oil. The unsaturated fatty acid content, although higher than that of Coconut Oil, is still quite low, and thus does not favour the development of oxidative rancidity.

GLYCERIDE SEPARATION

It is possible to separate suitable glycerides from Palm Kernel Oil, and these form the basis of the well-known Palm Kernel stearines, which have physical properties resembling the more expensive Cocoa Butter, being hard brittle fats with melting points just below body temperature (37° C.).

The higher content of unsaturated fatty acids renders Palm Kernel Oil a very suitable fat for hydrogenation, and a useful range of hardened Palm Kernel Oil products may be obtained according to the degree of hydrogenation. Complete melting points may be obtained as high as 48° C.

Palm Kernel Oil was once considered to be less stable than Coconut Oil, but with modern methods of processing this distinction has passed away, and Palm Kernel Oil and its products are very stable fats.

LN:47 8058

FOOD MANUFACTURE

Vol. XXXIII, No. 12 December 1, 1958

Food surpluses

In last month's issue of Food Manufacture, we commented in these columns about the lamentable position which still exists in the world with regard to food surpluses, which forces some countries deliberately to curtail production whilst others go short. A farmer's view—one might almost say the official farmers' view—on this subject has now been given by Mr. J. K. Knowles, general secretary of the National Farmers' Union. Speaking in Lincolnshire last month, Mr. Knowles called to other countries to "play their part and co-operate with us in dealing with the problem of food surpluses on a sensible international basis.

"It is high time," he said, "that our Government made it clear to the Continental countries that they must be more realistic in the matter of trade in agricultural products. There must be less of the habitual reliance on this country to absorb any food surplus that any other country might want to dispose of. The U.K., although it is the world's largest food importer, cannot be expected to remain the only country in Europe with an ever-open door for food imports.

"Other countries must play their part and co-operate with us in dealing with the surplus problem on a sensible international basis. They must open up their own markets and stimulate their own domestic consumption of agricultural products. At the same time, they should—because it is in the common interest—help us in carrying out some of the recommendations made by the International Federation of Agricultural Producers for the disposal of surpluses on a commercial basis."

On wheat, Mr. Knowles warned that the continued attempt to solve the surplus problem on a non-commercial basis could easily bring economic disaster. "What is needed, as the recent I.F.A.P. conference in Brussels recommended, is an international arrangement for funds to be made available to under-developed countries to enable them to purchase more wheat at commercial prices—in other words, urgent international action to avert serious economic distress in both East and West. Farmers wherever they are, must lend their voices to persuade Governments to take action accordingly. We, in the Union, will continue to press very strongly for action along these lines. We must all remember that if the under-developed countries prosper, trade generally will prosper, and that benefits everybody. If helping to clear surpluses also helps the countries concerned to prosper, then our efforts will do good all round."

Referring to the proposed Free Trade Area, Mr. Knowles said that the proposal for a separate treaty to deal with agricultural products was supported by the Union as "a constructive attempt to secure a new basis for the treatment of agriculture within the European Free Trade Area discussions. We still hold the view that if there is to be a Free Trade Area, these agricultural problems should be dealt with separately and need not hinder in any way the development of a Free Trade Area for industrial products."

Sugar board reports

The first annual report of the Sugar Board was placed before Parliament recently by the Minister of Agriculture, Fisheries and Food. It deals with the activities of the board from the time it was established to June 30, 1958, and includes an audited statement of the board's accounts for that period.

The Sugar Board was set up under the Sugar Act, 1956, with the main functions of purchasing the negotiated price quota sugar the United Kingdom undertakes to buy under the Commonwealth Sugar Agreement and reselling it to private traders at open-market prices, and of making good deficits incurred, or receiving surpluses realised by the home beet sugar industry. This was done to reconcile the restoration of private trade in sugar with the Government's obligations under the Commonwealth Sugar Agreement and its guarantees to the sugar beet producers in the U.K.

The board buys some two-thirds of Commonwealth exports of sugar and sells it on the free market. The price at which it buys is fixed annually by the Minister in negotiation with Commonwealth exporters to yield a reasonable remuneration to efficient producers, and is normally above the free market level at which the board sells. The board

recovers its deficit by way of a surcharge on all sugar, collected by H.M. Customs and Excise at the duty point. If, exceptionally, owing to high world price of sugar, the board accumulates a surplus, this may be paid out in the form of distribution payments. By use of the surcharge and distribution payments, the board is required by the act to adjust its trading balance so as to keep its overall position stable, taking one year with another.

The board started operations at the end of 1956 in the early stages of an exceptional boom in sugar prices, set off by poor 1956 sugar beet crops in Europe coinciding with exhaustion of stocks in Cuba at a time of international tension. It thus earned a considerable surplus in the first few months, and distribution payments were introduced in July, 1957. The free market price fell sharply in the second half of 1957, and a surcharge was re-introduced in February, 1958.

Despite the initial difficulties due to the unexpectedly violent fluctuations in market prices, the new arrangements are reported to have worked successfully, and to have met with co-operation from all concerned. For the period October 15, 1956, to June 30, 1958, £11·2 million was outgoing on the purchase and re-sale of 2¼ million tons of Commonwealth sugar, and in respect of the production of about 1¼ million tons of sugar by the British Sugar Corporation. Net receipts of £11·4 million were offset by distribution payments amounting to £7·8 million, leaving an under-recovery at June 30 of £7·6 million approx. This is well within the figure of £25 million which the Act authorises the board to borrow in order to prevent frequent alterations in the rate of surcharge to match fluctuations in world price.

What's in a name . . . ?

FISHMONGERS are soon to get official advice on how to name the fish on their slabs—and if they don't follow this advice they may find themselves in the courts. The advice is to be contained in a special "Code of Practice" to be issued during the next few weeks by the White Fish Authority. It will contain a list of recommended names under which all types of fish should be sold at the retail stage.

"We are at present consulting the British Museum on the Latin equivalents," said Mr. L. W. Jackson, secretary to the authority. "Immediately the list is approved it will be issued."

The list will give the accepted trade names for all types of fish usually bought by the housewife and, against these, the Latin name as agreed by the museum experts. Fishmongers using other than the accepted trade names may be taken to court by food inspectors on the charge of using a fake name to deceive the public.

The idea is to give the housewife more protection when buying the family fish and to stop unscrupulous traders from using such terms as Scotch hake when selling catfish, and rock salmon to describe coalfish. At one time the White Fish Authority had proposed that regulations carrying the full force of law should be issued instead of the less commanding code of practice. They had suggested that accepted trade names only should be used and that all fish should be labelled while on the slab. This had little support from health authorities and inspectors, however, most of whom argued that they had not the staff to enforce this type of legislation.

"This list should do away with all those complicated arguments in court about whether a fishmonger is or is not using an accepted 'trade name,'" a London chief public health inspector stated.

Freezing at sea

MEANWHILE, the dispute with Iceland about a 12-mile fishing limit appears no nearer settlement. A recent issue of *The Times* contains an article giving a broad perspective of the effect which the establishment of a general 12-mile fishery limit would have on the British economy as a whole, on the price and quality of fish in the United Kingdom, and on the fishing industry itself. The establishment of such a limit around Iceland alone would deprive us of 10% of the demersal fish (*i.e.* fish which feed on the seabed, such as cod, haddock and plaice) caught annually, and if the ultimate Icelandic aim of an extension to include the whole of the continental shelf to a depth of, say, 100 fathoms were carried out, we should be deprived of one-quarter of our supplies of this type of fish. Even a general extension of the limit to 12 miles would also deprive us of a quarter of our demersal catch. The interesting comparison is made that if we had to purchase this fish elsewhere, the cost in foreign exchange would fall not far short of that of maintaining the 55,000 troops stationed by Britain in Germany during 1958.

All this gives additional topicality to two leaflets issued recently by the D.S.I.R. If our trawlers are forced to seek fish from further and further distant waters, improved methods of preserving the catch will become vitally necessary, and these leaflets deal with two aspects of this problem. The first discusses the principles of scientific cleaning, and is aimed not only at trawlermen but at everyone in the industry who is called upon to handle the fish between the time it is caught and the time it is consumed. As the report emphasises, a thorough understanding and the diligent application of these principles can do much in itself to improve the quality of our fish, and conversely to extend the maximum time which can be allowed between catching and consumption.

Perhaps a more fundamental approach to the problem, however, is discussed in the second leaflet, which considers the question of freezing fish at sea. The quick-freezing of various fruits and vegetables has introduced us to a standard of freshness hitherto unknown in the same commodities when marketed through traditional channels, and fish would seem to be a commodity which could benefit especially from similar treatment. Moreover, the fishing industry is peculiarly prone to suffer from seasonal gluts and scarcities, and the freezing of part of the catch at sea, as advocated, would enable this portion to be stored when fish was plentiful against such time as it should become scarce.

The equipping of trawlers with freezing equipment on a large scale would undoubtedly entail considerable expenditure for an industry which tends to be divided into fairly small economic units. But the facilities for such re-equipment undoubtedly exist, and many of the firms, if forced eventually to take this step, may well find that they have been given the opportunity to make considerable virtue of necessity.

Cow eats cow

UNDER this somewhat intriguing title, a note appears in the November issue of our associate journal *Dairy Engineering* discussing a system for increasing the longevity—and hence the milk yield—of dairy cattle. The system has been developed by Mr. Stephen Williams, who runs the dairy farms owned by Boots the Chemists, and in an issue in which we devote special attention to dairy products it is worthy of further mention.

The phrase "cow eats cow" is apparently Mr. Williams's own creation, and refers not to a propensity of the cows to become cannibalistic with increased age, but to the fact that under his system the cows are allowed to live and produce milk partially by the consumption of their own body reserves during the first few months of lactation. For a period of a few months after calving, they are deliberately fed below their theoretical nutritional requirements, and as a result they lose weight. A cow weighing half a ton is budgeted to lose fully 2 cwt. in the first five months.

Mr. Williams's system is based on his argument that one of the principle economic problems facing British dairy farmers today is the short productive life of the average dairy cow. Expressed as a national average her milking career is barely more than three lactations before disease brings it to a premature close. It is from her second lactation onwards that the average cow moves to her productive prime, says Mr. Williams, and most of our dairy cows never reach it.

Under Mr. Williams's system the cow is fed more generously in the middle period of lactation to prevent more weight loss and in the later stages she is fed still more to put back her lost weight and to replenish all her bodily reserves. During the whole lactation she is fed with good quality bulky foods with sufficient digestible fibre—such as is provided by good hay or grass.

Mr. Williams points out that this prolongs the cow's life for the following reasons. At a time when the cow may be making 70 lb. of milk a day, it relieves her legs, hocks and feet of weight for easier standing and walking. Her vital organs are relieved of their stored fatty tissues. She maintains a greater vigour, keeps her interest in her food and does not go stale. "By calling on her bodily reserves at her period of highest milk production," says Mr. Williams, "the farmer does not have to overburden her with too much concentrated food which she is not by nature equipped to handle. Nor is the endocrine balance of the cow unduly disturbed by excessive stimulation."

The advantages of the system, Mr. Williams claims, are that his cows live three times the natural span, they are free from disease and their milk yields rise steadily from 900 to as much as 1,400 gal. per year.

Home-grown pickles

FURTHER progress was made recently on a joint project, involving the National Farmers' Union, the Food Manufacturers' Federation, the National Vegetable Research Stations, and the British Food Manufacturing Industries Research Association, to develop the cultivation in Britain of brown onions suitable for pickling. This occurred at the B.F.M.I.R.A. laboratories at Leatherhead, where an assessment of various onions so far grown was held.

Pickled onions have long been popular with the British public, either as a savoury adjunct to a main meal or as part of a snack. Indeed, so popular is the pickled onion that the current production of the brown variety amounts to some 35 million jars annually of the popular 10-oz. size.

For many years past the onions used in this trade have been imported, principally from Holland and Egypt, but some time ago, because of the flooding of the British market with large quantities of European onions of the larger sizes, an extra duty was placed on imported onions to protect the British growers. This duty had to apply with equal force to onions of the type and size used for pickling, and British pickle manufacturers were therefore faced with a steep increase in the price of their raw materials. Since alternative supplies of this particular type of onion

were not available from domestic source, they protested vigorously through the Food Manufacturers Federation, but were unable to obtain any action in their favour.

It was therefore decided—as it might well have been before—that a little enterprise would probably result in the development of satisfactory supplies from local sources, and the joint project was launched.

Considerable progress has already been made, and the assessment recently was of those varieties of onion previously deemed worthy of further investigation, cultivated under varying conditions. As well as the selected varieties themselves, other variable factors included the dates and rates of sowing, and the localities in which the onions were grown. The effect on the quality of the onions of spraying with maleic anhydride for the inhibition of sprouting is also being examined. The onions were examined chiefly for shape and texture, and they will now be pickled in the Research Association's laboratories, after which further assessments of quality will be made. Factors such as yield and the proportion of onions produced of a suitable size for pickling will also be taken into account.

Enquiries are quite often received about alternative sources of Dutch silverskin onions, that other pickling favourite, and one hopes that with the organisation already in being, the various bodies concerned will consider undertaking similar trials on this type of onion if and when the present trials are brought to a successful conclusion.

Help from the atom

THE dangers arising from the contamination of food by the radio-active by-products of nuclear explosions have frequently been commented on in these columns. It is pleasant to turn for a change to the brighter side of the picture—the beneficial use which may be made of nuclear radiation to improve man's food supplies. In a brochure issued recently, Dr. R. A. Silow, of the United Kingdom, chief of the Atomic Energy Branch of FAO, discusses the present use and the future potentialities of radiation in food preservation and processing and in plant breeding, and the proved and constantly expanding role of radio-isotopes in agricultural research. The brochure is printed in English, Spanish and French, and is available from FAO's regional information offices.

Dr. Silow's report, which first appeared in the *International Journal of Applied Radiation and Isotopes*, seeks to answer the question: How can the undoubted promise of atomic energy for raising nutritional levels and living standards be speedily translated into reality?

It makes certain reservations about the conditions under which radiation techniques should be employed in food-preservation and plant-breeding programmes. But it says that no such reservations are necessary in the case of radio-isotopes in agricultural research, for their use is "something from which all countries can benefit immediately."

Radio-isotopes as a research tool, the report says, are a highly sensitive and versatile but relatively inexpensive means of adding to man's understanding—and therefore control—of the complex physical, chemical and biological processes involved in the production and use of food and other agricultural products. With their help the investigator is able to achieve results not otherwise attainable, or to achieve them with greater precision and speed and at less cost. Already much progress has been made in the development of better and cheaper ways of producing crops, forest trees and farm livestock, and protecting them from pests and diseases, whilst the use of radio-isotopes in fisheries research is leading to better planning of fishing operations and therefore more efficient use of inland and ocean fisheries resources.

Dealing with the uses of irradiation in food processing, Dr Silow says that it may make "an important contribution to available food supplies by helping to reduce the serious losses that occur at all stages between production and consumption." He goes on to discuss the progress which has already been made in the preservation of food by irradiation, and the difficulties which have arisen as a result of the failure of irradiation to prevent chemical and enzymic changes occurring in the foods treated, and of its tendency to induce undesirable changes in the colour, odour and flavour of the foods.

Dr. Silow also deals with the contribution of radiation to plant breeding experiments, and the efforts being made to produce improved types of food plants. The power of ionising radiations to induce mutations—so much to be feared when uncontrolled irradiation of the populace is concerned—have here been used to greatly speed up the normal processes of selection, breeding and testing, and Dr. Sinden quotes several examples of crops which have been markedly improved by means of radiation-induced mutations. Cash benefits on certain of these crops have already greatly exceeded the cost of the original research.

Pointing out that the use of radiations in plant breeding is in its infancy, the report says, " . . . it is justifiable to predict that the use of radiation to develop improved varieties of crop plants will in due course rank amongst the most valuable of the contributions of atomic energy to the welfare of mankind."

Some Observations on the Electrical Stunning of Pigs–2

By Sv. Mogens Blomquist*

In the second part of this article, the author turns to the subject of blood splashes in the meat, and discusses the effect on the incidence of these splashes of various stunning techniques.

III. EFFECTS OF STUNNING ON CARCASS QUALITY

With Reference to Hæmorrhages and Different Sources of Current

SINCE the introduction of electrical stunning, industry has complained about various undesirable effects of it on carcass quality. These include:

1. Blood splashes in the flesh.
2. Hæmorrhages in the lungs.
3. Stiffness of the carcass.
4. Reduced keeping quality of the meat.

One of the purposes of the present study has been to determine the extent of any such undesirable effects. During the course of the study, effects of variations in the following factors have been investigated:

1. The electrical potential on the electrodes.
2. The frequency pattern of the current.
3. Duration of application of the current.
4. The time lapse between stunning and sticking.
5. The condition of the animal at the time of slaughter.

Blood splashes in the flesh

Various workers have concerned themselves with the effect of electrical stunning on the bleeding of the carcass. Eddington and Elliot[7] and Clark and Tweed[8] found less blood in meat from electrically stunned pigs than in meat from non-stunned animals. Experiments made in this Institute and the Departments of Animal Physiology and Endocrinology and Sexual Physiology at the Danish Veterinary and Agricultural College did not reveal any significant differences between the amount of blood obtained from stunned and non-stunned animals (Moustgaard *et al.*[9]).

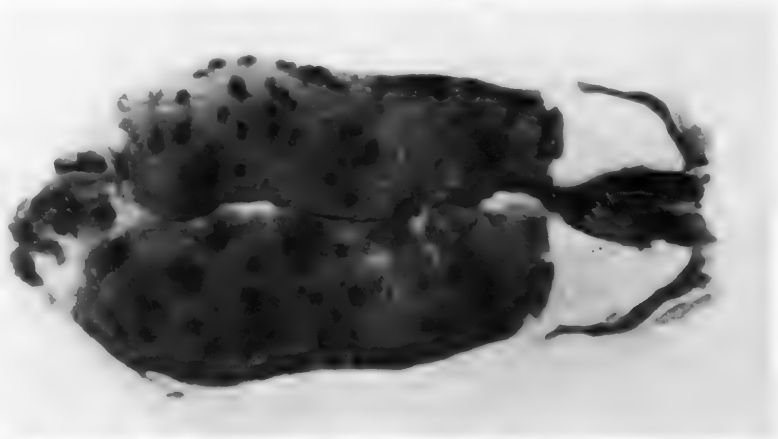

Fig. 5. Pork loin showing extensive blood splashes due to electrical stunning by the so-called traditional stunning method.

Occurrence of blood splashes (extravasates) in pig muscles has, however, long been known, and has generally been considered a result of shooting or electrical stunning. The extravasates appear as dark red, sharply limited points of pea size or less. An example of blood splashes of this kind in longissimus dorsi of a pig stunned electrically is given in Fig. 5. The splashes may occur in almost any muscle. Most frequently they are observed in the hip and thigh, the eye muscle (*longissimus dorsi*), the diaphragm and some muscles in the shoulder. Microscopically, it was found that blood splashes are due to capillaries ruptured because of overfilling with blood (Slagtemetodeudvalget[1]). It appears that the occurrence of such blood splashes does not mean that bleeding of the animal is incomplete. Extensive blood splashes as shown in Fig. 5 seem to be connected with stunning. We have, in spite of our quite extensive experiments, only one case on record when such blood splashes were seen in a non-stunned pig.

Estimating the extent of blood splashes

In Danish studies of the frequency of any such splashes in non-stunned and electrically stunned animals, the following methods have been used and will be referred to below:

A. A general inspection of the split and chilled carcass, taking more than five single extravasates to indicate the occurrence of bleeding.

B. The ATV group inspected the hot carcass and found a number with numerous extravasates in some section. These were so extensive as to be considered a serious impairment of quality.

C. The ATV group also counted all carcasses showing from one to ten single extravasates, but such bleedings were not considered to have any real significance with regard to meat quality.

D. The ATV group inspected

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the cutting up of cured hams for canning. Each ham was cut in four to five pieces. All extravasates in all surfaces were observed, and more than ten per ham were considered as an impairment of quality.

The methods mentioned above will be referred to as methods A, B, C, and D respectively in the following.

Preliminary experiments carried out by this Institute confirmed that blood splashes occur with increased frequency in electrically stunned animals. Table 1 summarises experiments where method A was used for counting the blood splashes and where 6 to 9% of the stunned carcasses exhibited such splashes, while none were found in non-stunned animals.

The ATV group came to the conclusion also that electrical stunning as described above does cause blood extravasates which may constitute a serious impairment of meat quality.[1]

Therefore, an effort was made by us to test various stunning methods and conditions to see if a method could be devised that did not produce this highly undesirable effect.

Testing various sources of electrical current

Converter versus transformer. Alternating current is usually used for stunning. The current to the electrodes of the stunning tongs is either supplied from the main AC supply through a transformer or from a DC supply by the aid of a converter which is connected to a transformer. The current from the two sources have somewhat different wave patterns, although they both have the frequency of 50 periods a second.

In order to investigate the effects of different current conditions, some experiments were carried out by this Institute:

1. A 220 v. converter (Kemp and Lauritzen) having separate winding connected to a two-branch transformer (150/50 v.) with a large iron core. The transformer had a section of the primary coil as well as a part of the secondary coil wound on each branch of it.

2. A transformer (220/58-65 v.) with a small iron core having three branches and wound so that both coils were around the centre branch. The primary coil was inside the secondary one. This arrangement means that the transformer will have a certain capacitor effect, allowing a sudden variation in potential to pass by capacitative induction from the power supply through the coils to the pig.

The wave pattern of the two systems were observed on an oscillograph. The results are indicated in Fig. 6. The transformer gave a sinusoid pattern while the converter aggregate produced a rather trapezoid pattern.

Fig. 6. Frequency pattern as observed on an oscillograph.

Table I. Frequency of animals showing blood splashes after stunning by various methods compared with non-stunned animals

Pigs stunned with transformer

Number of pigs	*Number of pigs with blood splashes (Method A for counting)*
172	1
124	17
400	40
400	26
129	11
370	54
200	22
1795	171 or 9·5%

Pigs stunned with converter

Number of pigs	*Number of pigs with blood splashes (Method A for counting)*
260	14
353	14
214	15
169	15
142	15
1138	73 or 6·5%

Non-stunned pigs

Number of pigs	*Number of pigs with blood splashes (Method A for counting)*
114	0
100	0
214	0 or 0%

To test the effect of these patterns 12 experiments, comprising a total of 2,933 pigs, were carried out using two-hand tongs (Siemens). The current was applied for more than 8 sec. and not less than 10 sec. elapsed between stunning and sticking. In 7 trials the transformer was used, in 5 the converter aggregate. Table 1 contains the results from examinations of split carcasses for blood splashes in the flesh counted according to method A mentioned above. It can be seen that the converter aggregate resulted in a considerably reduced frequency of blood splashes compared with the transformer, the number of carcasses showing splashes being 6·5% and 9·5% respectively. The difference is statistically significant at $P = 0.001$.

Trapezoid wave pattern. Experiences from electroshock therapy of human beings indicate that trapezoid or square waves are less harmful although physiologically more active than sinusoid waves. A current supply with square wave pattern as shown in Fig. 7 was generated in a vibrator connected to a 220 v. DC current outlet. The voltage on its secondary outlet was 220 v. and had a frequency of 50 Hertz. The voltage was transformed to 60 v. in an ordinary transformer. The intermediate circuit was connected to the ground. 560 pigs were stunned and only 5% showed blood splashes in the flesh using the counting method referred to as A. This is a little better than the percentage when the converter aggregate is used (see Table 1). Thus, it seems preferable to use current of square wave or trapezoid patterns rather than of a straight sinu-

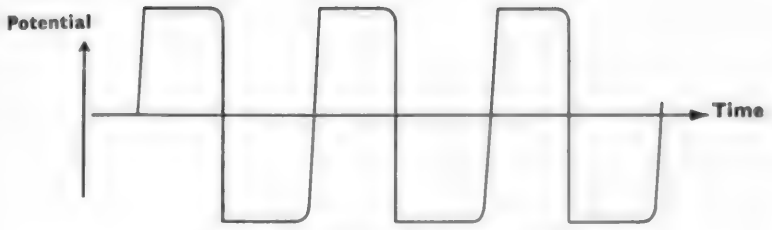

Fig. 7. Electric square wave pattern.

soid pattern for stunning pigs, judged on the occurrence of blood splashes.

Stunning at constant current

A transformer, which gave a constant voltage of about 240 v., was used, and a resistance of 100 ohms was placed before the tongs in the circuit. Since the resistance in the head of the pig is about 150 ohms, this should give a current of about 1 ampere. Two-hand tongs were used. The stunner used rubber boots for protection.

198 pigs were stunned with this equipment. The stunning time was about 10 sec., duration between stunning and sticking about 35 sec. The current during stunning varied between 0·7-0·85 amp. The reaction of the pigs was much the same as when ordinary equipment is used. Using method B, the blood splashes on the carcasses were counted. Three (1·5%) exhibited serious bleeding.

On the whole, no advantage seemed to be obtained through the use of constant current equipment. Since such equipment constitutes an additional shock hazard, no further experiments were made with this method.

Capacitative potentials

The higher incidence of blood splashes when the transformer was used may be suspected to be caused by either the wave pattern or by the occurrence of capacitative currents. By placing a neon lamp between the secondary coil and the ground we were able to demonstrate that capacitative potentials may exceed 142 v. In order to suppress the capacitative current we inserted a filter in the circuit on the secondary side of the transformer. The arrangement is shown in Fig. 8. The filter is so constructed that another transformer wound 1 : 1 is placed on the secondary side of the main transformer. The so formed intermediate circuit was connected to the ground. We used this filter and 209 pigs were stunned; 7% showed blood splashes in the meat. It seemed that the filter had reduced the frequency of blood splashes to nearly the same level as the converter aggregate.

Inductive potentials

Inductive potentials appear when the current is switched on and off at the beginning and end of the stunning. The potential depends on the position of the wave at the moment of switch and the quickness of the switch. The induction potentials were measured with an oscillograph connected between the secondary coil of the transformer and ground. A potential of about 350 v. was found during stunning.

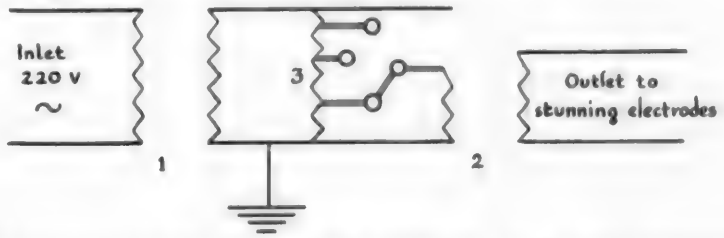

Fig. 8. Transformer with filter. 1. Main transformer. 2. Auxiliary transformer. 3. Regulating resistance.

In laboratory experiments inductive potentials as high as 2,000 v. have been recorded when the current was broken through a drop of saline on the points of contact. This was believed to be similar to what may actually happen in the contact between the wet electrodes and the electrolyte-covered skin of the pig. As is known, such breaking of a current may make inductive potentials more likely, since the heat created by the current in the saline generates steam bubbles around the electrode thereby breaking the current. The electrode will then cool and the steam bubbles collapse. Then the current will resume. In that way 10-1,000 breaks of current may occur per second.

It was attempted to eliminate these potentials through a system of neon lamps. Some of these were placed between the connection to the two electrodes and the ground. In the event of a potential higher than 50 v., the lamp would connect. Another was placed between the two connections to the electrodes; it would connect at about 140 v. Examinations of carcasses seemed, however, not to show any reduction of incidences of blood splashes as a result of this neon lamp attachment. Thus, while it has been demonstrated that the pigs are exposed to high electric potentials during normal electrical stunning arising from induction when the current is switched off, this does not seem to be an important factor for the occurrence of blood splashes.

Diversion of current

Some observations indicate that electrical stunning may be harmful to carcass quality if carried out under conditions when the pig is on a floor or in a trap not insulated from the ground.

Glatzel[10] frequently found considerable blood splashes on the carcass when pigs were stunned in a steel trap, as is customary in Germany. Glatzel states that insulating the trap from the ground materially reduced the damage. It has been suggested that the current may not always flow directly through the pig's head between

the two electrodes but also from the electrodes to the ground through other parts of the animal. This would be especially pronounced when the floor of the sticking pen is wet and on rainy and humid days when the skin of the pigs is wet.

In order to reduce such uncontrolled currents, special three-electrode tongs were constructed. One of the electrodes was placed between the eyes of the pig and carried the required potential while the two others were placed behind the ears and connected to the ground.

Practical experiments with these tongs showed that the pigs were stunned very rapidly. The experiments were, however, not conclusive as far as blood splashes in the meat or lung hæmorrhages were concerned. Such tongs are very difficult to use under practical conditions, and further experimentation with them was therefore discontinued.

High potential stunning unit

Our tests included a Dutch stunning unit, the so-called Elther apparatus. This unit has been described by Tervoert,[11] it exposes the pig to a potential of 150 v. Two-hand tongs with dry, sharp electrodes are used. The current is switched on by means of a button. A relay switches the current off after one second. When stunned, the pigs collapse in a relaxed state and subsequently they start to move their legs. After approximately 15 sec. the pigs were shackled in a completely relaxed condition and then stuck. The sticking took place within 40 sec. after the termination of the electric current. However, in our experiments, stunning 316 pigs with this unit gave 21% carcasses with blood splashes, using method A in counting. Many exhibited extensive splashes. Therefore, economic reasons forced us to discontinue the experiments and we concluded that the installation did not offer any advantage with regard to control of blood splashes.

Since the introduction of the short-interval method referred to later, much could be said for testing this in combination with the Elther apparatus. We have not done so because we feel reluctant to use a voltage of 150 v. on openly exposed electrodes in a slaughterhouse.

Table 2. Observation on diffuse bleedings

		Split carcasses	*Cut hams*
Non-stunned	Number of samples	196	485
	Number of bleedings	22·5%	13·0%
Traditional stunning method ...	Number of samples	385	79
	Number of bleedings	21·3%	6·4%
Short interval stunning method ...	Number of samples	256	543
	Number of bleedings	22·3%	14·0%

Table 3. Stiffness of carcasses

Stunning methods	*Number of animals*	*Number of stiff carcasses*
Stunning 3-6 seconds, no resting	60	6 (10%)
No stunning	60	0 (0%)
Stunning 11-17 seconds, 11-15 seconds resting	60	2 (3%)
No stunning	60	0 (0%)

Source of current and blood splashes

No solution to the problem of blood splashes was found in any of the experiments described here. Meanwhile, the ATV group suggested the use of the short-interval method referred to below. Where this method can be used, blood splashes seem no longer to be a serious problem. For this reason, experiments regarding these matters have been discontinued.

Duration of stunning

To counteract blood splashes it seems of some importance that the electrodes be kept on the pigs for at least 12 sec. This result is the outcome of one experiment where the transformer was used. 428 pigs were subjected to electrical stunning for 4 sec., while 627 pigs received 12 sec. of stunning. Using method A for counting blood splashes, 10% of the first lot were found affected compared to 8% in the second lot.

Time lapse between stunning and sticking

As mentioned above, it has been the usual practice in Danish slaughterhouses to stick the pigs when their muscles have relaxed after the impact of electrical stunning. That meant that sticking took place about 50 sec. after stunning. At that time the pigs are at the end of the clonic phase or in the beginning of the comatose phase of the anæsthesia. It has been suggested, however,[12] that the pigs should be stuck as soon after stunning as possible and while still in the tonic condition. The ATV group investigated this idea and has shown, as mentioned above, that the blood splashes may be eliminated in this way. The ATV group has given the following explanation for this:

In the tonic phase, the muscle tissue is contracted and the capillaries almost empty of blood. Even though blood pressure is high in the arteries, the blood cannot enter the capillaries. When the pig is stuck before the expiration of this phase, the pressure is released through the bleeding before the clonic phase where the blood, under the elevated pressure, may otherwise re-enter the capillaries.

The ATV group carried out a series of experiments on this subject. Using two-hand tongs and an ordinary transformer, 385 pigs were stuck about 50 sec. after stunning, and 8·4% of the carcasses had blood splashes. Using method C for counting, 3 carcasses, or 0·8%, had extensive splashes which definitely reduced their quality. Afterwards, 256 pigs were stuck 5-10 sec. after stunning and 6·6% of the carcasses contained blood splashes in the meat, using method C for counting. Out of them, however, none could be regarded as seriously impairing the quality of the meat.

The experiment also comprised an examination of carcasses from

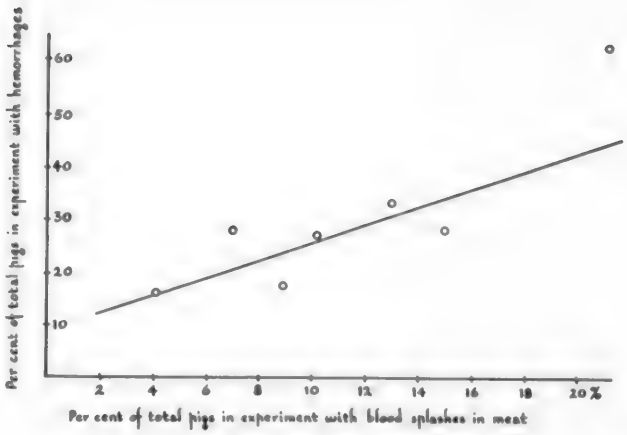

Fig. 9. Relationship between the occurrence of lung hæmorrhages and of blood splashes in the meat.

non-stunned pigs. In a total of 196 pigs, 5·5% were found to have weak blood splashes in the meat. Thus, blood splashes cannot be eliminated completely.

Similar results were obtained by the ATV group using method C for counting blood splashes found in the cutting up of hams. Out of 79 hams from animals stunned by the traditional method, 5·1% showed more than 10 single extravasates. However, no hams with more than 6 single extravasates were found in 543 hams from animals stunned according to the short-interval method nor in 485 hams from non-stunned animals.

Sticking the pigs 15-20 sec, after the termination of stunning will not eliminate blood splashes. We found in one experiment, using method A and B for counting blood splashes, that out of 539 pigs stunned in this way 39 (7·2%) showed blood extravasates; of these, 2 (0·4%) had serious quality impairing bleedings.

These experiments seem to warrant the conclusion that blood splashes which impair quality can only be avoided when the pigs are stuck 10 sec. or less after stunning.

Diffuse bleedings

Besides blood splashes, diffuse hæmorrhages may also occur in the meat. They are due to ruptures under physical stress and might be expected to occur more frequently after electrical stunning because the animal collapses in cramps under the impact of the electricity. Therefore, the stunner should cushion the fall of the pig to avoid any stress on it. Diffuse bleedings may also be expected to occur when the pig is hoisted by a hind leg, especially while in a paralysed condition as is done in the short interval method.

The ATV group studied the frequency of diffuse bleedings and arrived at the figures given in Table 2. The results indicate that such bleedings are quite frequent in all pigs, but no definite conclusions can be made with regard to the relative merits of non-stunning, traditional stunning or short-interval stunning. In this respect, the traditional method may be of some advantage.

Hæmorrhages in the lungs

Electrical stunning considerably increases the number of pigs having hæmorrhages in the lungs. The lung bleedings, like the blood splashes, are caused by the high blood pressure during stunning. In the various experiments with traditional stunning, the number of pigs with lung hæmorrhages have been approximately proportional to the number of pigs with blood splashes (Fig. 9). We have often noticed, however, that lung hæmorrhages and blood splashes do not always occur in the same animal. Some animals seem most susceptible to lung hæmorrhages, others to blood splashes in the meat.

Quite different from this were the results with the short interval method, *i.e.* sticking the pigs 5-10 sec. after stunning. In the experiments carried out by the ATV group, blood splashes were largely avoided, but the incidence of pigs with lung bleedings was about 25%—that is, about the same level as when pigs are stuck about 50 sec. after stunning.

This further confirms the explanation given by the ATV group regarding blood splashes. The increase in blood pressure during the tonic phase will immediately become apparent also in the fine capillaries of the lungs since here no contracted muscle tissue prevents the blood from gaining access to the capillaries.

In one experiment, the Elther apparatus gave a frequency of lung hæmorrhages of 65% on a total of 316 pigs. Thus, in this respect this apparatus does seem disadvantageous.

Our experience indicates that bleedings in gall bladders and internal organs will also occur occasionally after electrical stunning, irrespective of whether the traditional or the short-interval method is used.

Thus, lung hæmorrhages may not be prevented by the use of the short-interval method.

From an economic point of view hæmorrhages in the lungs are of far less importance than the blood splashes in the flesh.

Stiffness of carcasses

It has been a matter of some complaint that many carcasses from electrically stunned pigs were unusually stiff. This becomes noticeable after the carcasses are scalded, and renders dehairing, scraping and cleaning difficult.

An attempt to measure this phenomenon was made by having one person evaluate the carcasses during the slaughtering operation. A converter was used for stunning. In one group the animals were stunned for 3-6 sec. and stuck as soon thereafter as possible. In another group the stunning took 11-17 sec. and the animals were rested 5-15 sec. prior to hoisting.

(*Concluded on page* 511)

Mechanisation in the Cheese Industry

By W. G. Wearmouth* B.Sc., Ph.D., F.Inst. P., M.Inst. Pk.

Modern factory methods are now employed in what used to be essentially a farmhouse industry—cheesemaking. In this article, the author outlines the essential stages in the making of cheese, and discusses some of the changes which modern food engineering has brought about.

CHEESEMAKING used to be an art. Today, cheese is made on a vast scale in modern factories. Last year, for example, over 100,000 tons of cheese were produced in Great Britain. This quantity is equivalent to 4,000,000 gal. of milk per week. The skilled cheesemakers in these large modern plants are glad to use all available scientific control methods, for only in this way can successful results be achieved. Production on this scale has also been made possible by modernisation of traditional methods of cheesemaking. This review will deal with these major developments, and particular attention will be paid to the chemical engineering aspects.

The improvements that have been introduced have helped to reduce costs and have eliminated a large proportion of the hard labour involved in the traditional methods of cheesemaking. Despite all these advantages, a number of problems are occasionally encountered. These, together with the general economic situation of the industry, have probably discouraged further desirable improvements in factory cheesemaking processes. Fortunately, more milk has become available during the last two years for cheese manufacture; active research into the physico-chemical properties of milk and the scientific aspects of the cheesemaking process has continued; and further developments now seem possible. These potential improvements will also be discussed in this review with particular reference to the possible advent of a continuous cheesemaking process.

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Fig. 1. An example of modern curd stirring and cutting equipment attached to a large cheese vat.

Principles of cheesemaking

Scott[1] has given a detailed account of the principles of the cheesemaking process. Briefly, cheese consists of the precipitated milk solids and some of the original moisture of the milk. In fact, it is a much more complex product than this, owing largely to the action of selected bacteria and enzymes which are allowed to act under carefully judged and controlled conditions on those milk solids. Two of the more important actions change some of the lactose in the milk (it is converted to lactic acid) and the milk proteins. The latter are partially converted to various amino acids. The milk fats are also modified to a certain extent. It is interesting to note that a cheese made from fat-free milk has no characteristic cheese flavour.

In the original farmhouse method of cheesemaking, the milk was allowed to sour as a result of the action of the bacteria originally present in the milk. Rennet preparation was then added and the milk solids were afterwards separated from the whey. Batches of 50 to 100 gal. of milk were used and the whole process was carried out in very simple equipment.

The original milk contains from 3 to 4% fat and from 8 to 8·5% proteins and various salts. The rest, approximately 86%, is water. Cheese contains from 35 to 40% moisture, approximately 30% fat and 35 to 40% of proteins and other substances. A large percentage of the original lactose is lost in the whey. These complex changes have to be nicely controlled to achieve successful results. It is easy to see that a large

measure of chemical engineering must be employed in the commercial cheesemaking plants, which may handle up to 50,000 gal. of milk per day. Moreover, the raw milk is produced daily and it is a commodity which does not store or keep very well. It is therefore essential that the plant and process must be so designed that the main stages of the cheesemaking are completed in one day. Only in this way can the plant be ready for the next day's intake of raw milk.

Fig. 2. Another example of a modern cheese vat, equipped for mechanical stirring and cutting of the curd.

Manufacturing process

The actual making process is still carried out, as a batch process, in double walled or jacketed vats. The vats can thereby be heated with hot water to cope with the temperature changes called for in the process. These vats range in capacity from 750 gal., some being of 1,000 gal. size and a few even holding as much as 2,500 gal. Normally, the milk is first pasteurised to destroy many of the bacteria which are now considered to have caused some of the "making troubles" experienced by the old farmhouse cheesemakers, who normally employed non-pasteurised milk. The vats are filled with the pasteurised milk and the temperature is allowed to rise to 70°F. It is then necessary to add "starter," which gradually increases the acidity of the milk. Starter is a culture in milk of selected acid-producing bacteria (streptococci).

Once the cheese milk has reached a given acidity and the temperature has been raised to 86°F., rennet is added to produce a coagulum. The coagulated milk is quite rigid, but can easily be cut with a knife or wire. Indeed, when the coagulum is judged to be sufficiently firm (a subjective test is applied to decide when this stage is reached) it is cut into small rectangular pieces or cubes. Once this has been done, there follows a gradual "cooking" of the curd, with continuous stirring of the contents of the vat, to allow a controlled syneresis of the whey from the milk solids forming the curd particles.

Many studies of this stage of the cheesemaking process have been made, but the full details of the mechanism of it are not yet perfectly understood. It is, however, a fact that during the process the acidity of the whey increases, and once a certain increase has been achieved the stirring is stopped. This allows the curd particles, which have now become quite firm, to settle to the base of the vat. The factory cheesemaker still relies largely on a subjective judgment of this curd firmness before deciding that the settling process can begin. The whey, containing the unchanged lactose and the other soluble constituents of the milk, is then run off from the vat.

During the final draining the curd is piled by hand along the floor of the vat. This is called the cheddaring process. In the case of Cheddar cheese the consolidation produces a rubber-like sheet of cheese curd. In the case of Cheshire the curd is not allowed to settle so densely and it develops thereby a more crumbly texture at the finished stage. The acidity changes during the making process are somewhat different from those which operate during the making of Cheddar.

Once the curd has reached this final stage it is milled or shredded into smaller pieces which are then mixed with salt. The latter acts as a preservative and is said to enhance the flavour of the finished cheese. The mixed particles are filled into moulds and then shaped under pressure into the well-known characteristic shapes. The shaped cheeses are afterwards removed from the moulds and taken to the ripening rooms. In the old days any available cool room was used for ripening, but in most up-to-date factories carefully designed and air-conditioned rooms are employed for the purpose. The cheeses stay in these rooms for 2 to 4 weeks in the case of Cheshire. Cheddar cheeses require from 4 weeks to 3 months for ripening.

The cheesemaking process therefore consists of eight main stages, *viz.*, coagulation of the milk solids; cutting of the coagulum; stirring of the curd particles and whey to allow a controlled syneresis of whey; settling of the curd and separation of the whey; consolidation of the curd; milling and mixing with salt; pressing the curd into shape; and finally the maturing process to develop the finished texture and balanced flavour. The acidity changes may be of interest. From a level of 0·2% (expressed as lactic acid) in the milk at the start there is a rise to 0·65% in the expressed whey at the grinding stage and to 0·9% average in the whey exuded from the press. These figures are average for Cheddar.

Modern factory methods

Over the last 30 or 40 years, many developments have taken place in cheesemaking, and the benefits of these can be seen in present-day factory production methods. It is true that many of these processes are largely mechanised traditional methods; even

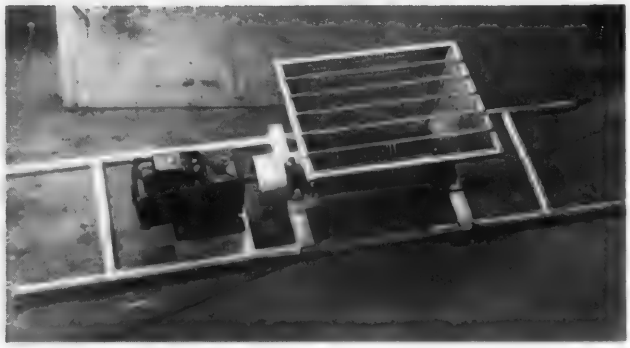

Fig. 3. A typical curd mill and salt mixing unit.

so, they have led to considerable savings.

The cutting of the coagulum and the hand stirring of the curds and whey have been replaced by mechanical paddles and cutting devices. Figs. 1 and 2 show some typical examples of modern stirring and cutting equipment fitted to cheese vats. The vats are heated by water jackets which can themselves be heated by free steam introduced via hand-operated steam valves. After the whey has been run off the cheddaring of the curd is carried out by hand, but the subsequent processes of milling and salting of the curd have been mechanised. Fig. 3 shows a typical mill and salt-mixing machine. Considerable changes in the press-moulding of the cheese have taken place over the years. The old hand-screw presses have been replaced by hydraulic presses operated by oil or by compressed air at pressures up to 15 lb. p.s.i. These new presses are said to give smoother loading, and this results in a better texture in the finished cheese. The hard labour which was required for the continuous adjustment of the old screw presses during the 18 to 30 hr. or so of pressing is also eliminated. Fig. 4 shows a typical installation of cheese presses. Improvements have also been made in the design of the actual moulds; 3-part moulds are now in quite common use.

Ripening

Great attention has been paid to design of cheese ripening rooms. Air-conditioned stores are now in general use. These can be maintained at a temperature selected from the range 48°F. to 55°F., with a controlled humidity of 85% R.H. Each manufacturer selects the temperature and humidity which is most suited to his own particular make of cheese, but the tolerance on relative humidity of the store is not very wide. At humidities higher than 85% R.H. there is considerable mould growth on the cheese surfaces. Below 85% R.H. the cheese tends to dry out, and this leads to cracks in the cheese and considerable spoilage. The higher the temperature the more rapidly will the cheese mature, but temperatures above 55°F. can be harmful, leading to the development of serious off-flavours in the finished cheese. The characteristic rind is formed on the cheese during ripening, and this is accompanied by a loss of moisture from the cheese. The final choice of the air conditions in the ripening room reflects a careful balance between a desire to get a maximum ripening rate and an effort to achieve a minimum loss in weight of the cheese during ripening.

The cheese can lose up to 5% moisture during ripening, and a large part of this occurs in the first few days. Moreover, the cheeses have to be cooled down by as much as 20°F. when they are first placed in the ripening room. The air-conditioning equipment has to be designed to meet these requirements. In the case of a factory handling some 40,000 gal. of milk per day, which is equivalent to approximately 18 tons of cheese, the conditioning equipment must be capable of removing at least 50 lb. of water per day at an average operating temperature of 50°F. This is based on the assumption that the ripening is spread over 40 days, and that the evaporation takes place at a uniform rate over that period. This, as shown above, is not quite a true picture. With earlier installations the evaporated water caused difficulties with the cooling coils in the conditioning plant, which necessitated frequent "defrosting." Later installations have been freed from this trouble, as a result of improved design based on better knowledge of the requirements. It is generally agreed that when cheese are ripened in these modern ripening rooms a much more uniform product is obtained. The incidence of bad-flavoured cheese has also been considerably reduced. Scott[2] has dealt in great detail with this particular problem. He shows, for example, that a typical cheese store designed to deal with eight 60-lb. cheeses per day will require equipment capable of extracting 40,000 B.T.U.'s per hour.

The cheese are placed on wooden shelves for the ripening process, and this leads to a non-uniform loss of moisture unless the cheese are turned frequently so as to expose the surface covered by the shelf. Originally, the cheese were turned by hand, but in recent years various mechanical turning devices[3] have become available. The cheeses are placed in wooden or metal cages which can be rotated through 180° so that the cheeses are thereby turned over completely as required. The appliances are reported to work most satisfactorily and to lead to considerable savings in labour.

Prevention of infection

During the actual conversion of the milk into curd, serious faults may develop; for example a complete failure of the expected development of acidity is not unknown. This leads to serious difficulties in the factory production programme, and much time and effort has been spent on trying to discover the causes of the fault. It is now recognised that many of these troubles are associated with an attack on the lactic acid producing bacteria by a virus or bacteriophage. This virus can be air-

Fig. 4. A modern installation of cheese presses. In many cases, improved mould designs are used in installations of this type.

borne. In very bad cases, the starter culture, added to the milk at the start of the process, can be seriously affected. In order to prevent this, it is now usual to inoculate the cultures under aseptic conditions, and special equipment has been designed for this purpose.

The whey is a source of contamination and it is customary to pump it immediately away from the cheesemaking rooms so that it can be dealt with in a separate building. The whey is sieved to collect the stray curd particles, afterwards it is centrifuged in order to recover the milk fat contained in it. The separated whey is either dried for use as animal feed or used for the preparation of lactose.

Some cheesemakers believe that some of the faults can also arise from bacteriophage infection of the milk while it is in the liquid state in the open cheesemaking vats. They have therefore made adjustments to the process which are designed to minimise this risk. They coagulate the milk with rennet almost immediately after the vats are filled, and use an additional amount of starter to ensure a more rapid development of acidity. The modifications are claimed to be most effective.

Yet another way which has been proposed as a safeguard against bacteriophage is now being introduced into British cheesemaking. It is based on a new medium in which the starter culture is grown and which is claimed to be immune from attack by bacteriophage. The medium is known as "Cockade P.R.M." (phage resistant medium). The progress of this material will be watched with great interest.

Future developments

It is clear that further developments are possible and some are already in train.

Probably the most costly part of the process is the cheese ripening. The stock must be kept for at least 28 days in specially controlled ripening rooms and under constant supervision. Substantial savings could therefore be derived from a successful reduction in the ripening time. Some research has indicated that the ripening process can be accelerated by employing alternating periods of high and low ripening temperature. Such a modification would automatically require a ripening tunnel equipped with zones of different temperatures through which the cheese could pass on a conveyor belt system. Other research shows that by irradiating the cheese with ultrasonic radiations for short periods the ripening process can be considerably accelerated. But these ideas have largely been set aside by recent developments in the use of polymer films for cheese ripening.[4] These films, originally proposed and used for this purpose in the U.S.A., have been found to work equally successfully for English cheese varieties (Stilton excepted). *Pliofilm*, *Cryovac*, special grade nylon, and specially waxed cellulose films (*Pukkafilm*) have all been found to be satisfactory. Great advantages are claimed. First, no rind is produced on the cheese—all the cheese is edible; secondly, there is no appreciable loss in weight during ripening; thirdly, no mould grows on the cheese and the cheese requires no turning; and, finally, there is no need to control the humidity in the cheese ripening rooms—the film ensures that the cheese contained in it is at an "equilibrium relative humidity." There is some evidence that the cheese ripen more quickly in these films, and it is possible that a considerable increase in this method of ripening will be seen in the near future. A photograph of rindless cheese made in this way is shown in Fig. 5.

Bacteriophage is probably a major single cause of loss in cheesemaking. Attention has already been drawn to steps which have been taken to minimise such losses. An additional precaution would be the complete enclosure of the vats with protective covers, since bacteriophage can be airborne. This is somewhat difficult to achieve with standard vats fitted, as they are with complicated overhead stirring and cutting gear. One possible way of overcoming this difficulty has been proposed by the writer.[5] The method employs a stream of purified compressed air blown into the base of the vat and arranged to cut and stir the curd and whey mixture. The vat can then be sealed with a close-fitting lid.

Two new cheesemaking machines recently introduced on the

Continent can be sealed off from the atmosphere. These are the Steinecker and Ahlborn machines. Both employ a circular vat, and the stirring and cutting gear is driven by a centrally mounted vertical shaft. The mouths of both types of vat can be completely enclosed with lids. So far as is known they have not yet been used in this manner in British factories.

A different approach to this problem was described by Berridge and his co-workers.[6] They suggest that measured additions of acids or selected lactones (which hydrolise in milk) to the milk and curd might be used to procure the desired changes in acidity. No starters would be required, and therefore there would be no complications due to attack by phage. They report quite promising results from preliminary trials.

Continuous methods

One stage of the cheesemaking process which is being studied very intensively at the present time is the cheddaring process. Czulak[7] has shown that deformation or flow under pressure and at a specified temperature is necessary for the cheddaring process to take place. He has devised a two-stage extruder which he claims will produce a most satisfactory imitation of the cheddaring process. A prototype of this machine is undergoing commercial trials. It should lead to a reduction in the average time taken for cheddaring. A somewhat different machine[8] for the same operation was recently reported. It is a novel extruder device. The walls of the extruder chamber are constructed of numerous small elements so designed that the whey can pass between them and through the composite wall of the chamber. The cheese curd is consolidated and extruded continuously as a solid plug.

Any machine which will reduce the making time and the amount of hand labour required should prove profitable to the industry, particularly if such machines can be designed to work as a continuous process. Unfortunately, for such equipment to operate with maximum efficiency, milk of more uniform qualities will be required. It is known, for example, that some milks will give a soft curd compared with others. This difference is thought to be connected with differences in chemical composition and possibly in the delicate balance in the milk emulsion. Research continues steadily on this general problem. There is little doubt that a limited success in this work will greatly encourage the development of machines like those described by Harper and his co-workers.[9] and by Hengsen.[10] These are only two of the many described in the literature of the last five years. In the machine described by Harper the cheese milk, starter and rennet are mixed together, then pumped to a vertical tube through which the mixture flows as a non-turbulent column. When the mixture reaches the top of the column the coagulum is set and it is then chopped into cubes as it emerges from the column. The whey immediately begins to exude from the curd and the syneresis is completed in a horizontal cylinder through which the whey and curd are driven by means of a worm screw. At the end of this cylinder is an extruding device which can cheddar the curd. In the second method (by Hengsen) the coagulating milk is filled into a rapidly rotating drum through the perforated walls of which the whey is strained off, the curd being pressed tightly to the walls of the drum. The curd is removed by means of fixed knives or scrapers which are introduced to the inside of the drum as it is rotated at a slower speed. Other attachments can be used to turn the curd until the cheddaring is complete.

Fig. 5. Rindless cheeses made with the aid of polymer films. Weight loss and mould growth are also prevented, and the cheeses do not lose weight during ripening.

Conclusions

The cheese industry in Britain has thus made considerable advances in recent years. The improvements have led to reduced production costs, less hard manual labour, and a more uniform end product. They have also enabled large quantities of milk to be handled on a factory scale. But these major changes have been largely devoted to the mechanisation of traditional batch methods. Now that even larger quantities of milk are becoming available for cheesemaking, fresh developments are likely. A continuous cheesemaking process is even a distinct possibility if current research on the properties of milk can lead to a clearer understanding of the causes of the variable nature of milk. The flavour-producing ingredients of cheese are being intensively studied, but different views are at present held about the actual flavour constituents. Once these differences are resolved it should be possible to create a synthetic flavour which, when incorporated in cheese curd, would reduce the present curing times required to develop the natural flavour.

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Measurement of the Colour of Evaporated Milk

by J. G. Davis and Pamela J. Stubbs*

COLOUR is one of the most important properties of all foodstuffs. A food may be excellent in all other respects, but if the colour is abnormal the consumer will either refuse it or buy it only with reluctance. For evaporated milk, sterility, stability, flavour and colour are the main properties of commercial interest. Manufacturers usually endeavour to obtain a milk as white as possible. It may also be noted that uniformity in colour is also important. If the consumer receives successive samples of evaporated milk which vary appreciably in colour he will tend to believe that the samples of unusual colour must be "off" or abnormal in some respect.

Evaporated and sterilised milk are fundamentally the same product. The essential differences are that evaporated milk is concentrated and homogenised, and should be absolutely sterile. Sterilised milk is homogenised but not concentrated, and absolute sterility is not required. Sterilised milk has a long history in this country, where its properties are well recognised. On the continent and elsewhere, however, it is often a new product and there is a tendency for the authorities to require it to be absolutely sterile. Evaporated milk usually receives a more severe heat treatment than sterilised milk; it may be heated up to 248°F. for 18 min. in order to ensure complete sterility. Nevertheless, manufacturers aim to make evaporated milk as like ordinary milk as possible, and so keep browning to a minimum.

A characteristic feature is the use of stabilisers to prevent precipitation of protein and calcium salts. This is necessary because the high temperature treatments required for sterility tend to destabilise the milk. Stabilisers are usually alkaline salts, and so raise the *p*H. As lactose becomes less stable as the *p*H rises from 6 to 7 (Davis and Rogers),[1] the excessive use of stabilisers, and particularly the more alkaline ones, will increase browning. For this reason the practice of adding sodium bicarbonate to increase heat stability is now only rarely used. Citrate is now the most popular stabiliser, but phosphates are sometimes used.

For general information on methods of manufacture see Crossley[2] and Hunziker.[3]

The Tintometer comparator in use.

Colour changes produced by processing

Heat produces two distinct types of change in milk, and these changes occur in both ordinary and concentrated milk.

1. **The whitening of milk.**—When milk is first heated it becomes whiter, this effect occurring at about 65°C. There is considerable evidence suggesting that the cause of this whitening is the denaturation and precipitation of the soluble proteins. These form large aggregates and so increase the reflectance of light (Rowland,[4] Burton,[5] Burton and Rowland).[6] Burton[7, 8] has made the interesting observation that there is a significant linear correlation between the degree of whitening of skim milk and the rate of heat coagulation after evaporation. The whiteness or reflectance of evaporated milk increases with the effectiveness of homogenisation (Lagoni and Merten).[9]

2. **The browning of milk.**—The browning of milk produced by heating was first considered to be due to the caramelisation of lactose (Kass and Palmer),[10] but research on the problem during the last two decades has given increasing emphasis to the role of protein in the browning process. It is now considered that the most important reaction is that between the aldehydes produced by the heat degradation of lactose and certain amino acids, particularly lysine, in the proteins. This is now commonly called the Maillard reaction and has been studied by many workers (*e.g.* Danehy and Pigman).[11] This reaction has also been studied by Krauss[12] and Tarassuk and Simonson.[13] The latter workers concluded that both the brown and the fluorescent materials produced by the evaporation process were derived from the proteins. The pigmentation increased during storage even in the absence of oxygen. Webb *et al.*[14] have shown that the rate of increase in colour varies logarithmically with temperature. The effect of various temperatures and times used in the manufacture of evaporated milk are discussed by Bell *et al.*[15]

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3. **Other discolorations.**—It is well known that tinned milks can sometimes produce peculiar colours when used for tea and coffee. The greenish-black colour sometimes produced when evaporated milk is used for coffee is attributed by Cole and Tarassuk[16] to a reaction between the iron dissolved by the milk after opening of the tin and the tannins in the coffee.

Effect of heating on nutritive value

Although investigators in different laboratories do not always agree on the extent of damage to the nutritive value of concentrated milk by heating at temperatures in the region of 240°F., there can be no doubt that some damage is done, particularly to the less heat-stable vitamins such as B_1, B_{12}, and C, and to the proteins. Quite apart from marketability aspects, therefore, it is desirable that heat treatment should always be controlled and kept at the minimum required for sterilisation purposes.

The loss in biological value of the proteins is closely associated with the browning of evaporated milk, *i.e.* the Maillard reaction. Lysine, which is predominantly associated with this reaction, and certain other amino acids in proteins are regarded as essential amino acids, because the human body cannot synthesise them. Excessive heat treatment of milk may result in up to 40% loss in lysine.[17-20] The unavailability may be due to the slower hydrolysis of the peptide linkages in which the lysine is involved,[21] and may be of greater importance for infants than for adults (Albanese *et al.*).[22] It is obvious that any loss in biological value of the proteins in evaporated milk will be the more serious the greater the importance of evaporated milk in the diet in any region.

For general information on the nutritive value of evaporated milk see Coulter *et al.*,[23] Rice,[24, 25] and Kon and Henry.[26]

The measurement of colour

Webb and Holm[27] used the Munsell colour system for measuring the colour of evaporated milk. Nelson[28] measured the colours of heated and evaporated milks spectrophotometrically, and also studied the effect of varying temperatures and times on colour[29] and other properties.[30] Similar studies have been made by Simonson and Tarassuk,[31] and Patton[32] has studied the effect of storage on colour development. Mohr and Wortmann[33] used the spectrophotometer, reflectometer, the Lange Leucometer and the Lovibond Tintometer for measuring the colour of evaporated milk. They noted certain advantages and disadvantages for each of these methods, and they also described a simple method using standard lacquered glass plates.

Experimental

For routine control purposes it is always desirable to use the simplest and cheapest reliable method. Expensive optical equipment may be necessary for research but is unsuitable for routine control.

A number of samples of evaporated milk have been obtained from different sources and colour matchings made by the Tintometer method in collaboration with Mr. G. J. Chamberlin. Experimental discs were then prepared and submitted to further trials. As with other milk products it was not found possible to obtain any one disc that would give a perfect matching with all samples, but a satisfactory disc was eventually evolved. This contained six colours, No. 1 being whiter than ordinary commercial samples and Nos. 4, 5 and 6 darker than fresh samples found on the market. Most new commercial samples matched against Nos. 2 and 3 on the disc. It is not intended to suggest that a good evaporated milk should match against any particular number on this disc. The intention is only to provide a disc which permits a simple method of recording colours of evaporated milks for routine control purposes.

Method of use

The Tintometer equipment, which is of the standard type (Fig. 1), is set up facing north daylight or suitable daylight lamp. The evaporated milk is poured into a porcelain dish, and this must be filled to the top. For matching purposes a pure white background is provided by a magnesium carbonate brick. The disc is then revolved in the ordinary way until the best possible match is obtained. Half disc values may be recorded if desired, but this should only be done when good matching is obtained.

As 8 per cent. of men are colour blind to some extent it is always advisable to check laboratory workers for colour blindness. The Ishihara test book may be used, or more simply the subject asked to distinguish and name the colours of strands of wool, with reds and greens predominating.

Similar discs have been described for sweetened condensed milk (Davis and Bell),[34] and for sterilised milk (Davis and Stubbs).[35]

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DAIRY MACHINERY DISPLAYED

The Equipment You Need— and Where to Get it

HIRON AND REMPLER

A WIDE range of machinery for the manufacture of all types of dairy product is supplied by Hiron and Rempler, Ltd., agents for the *Silkeborg* range of dairy equipment. For the butter maker, their *Top*-churn and *NZ* churns offer alternatives to suit many types of operation. The *Top*-churn is a stainless-steel unit so designed that during its end-over-end revolutions the butter is first compressed and then flattened out. This is claimed to increase the degree of churning, and to ensure that water and salt are distributed evenly throughout the butter, as well as increasing the fineness of texture of the butter. It is also said to necessitate fewer working speeds, so that the gearing of the churn has been simplified. The churn can be operated under vacuum, which can be drawn at any stage during the churning process without stopping the machine. There are no internal moving parts, which considerably simplifies cleaning procedures.

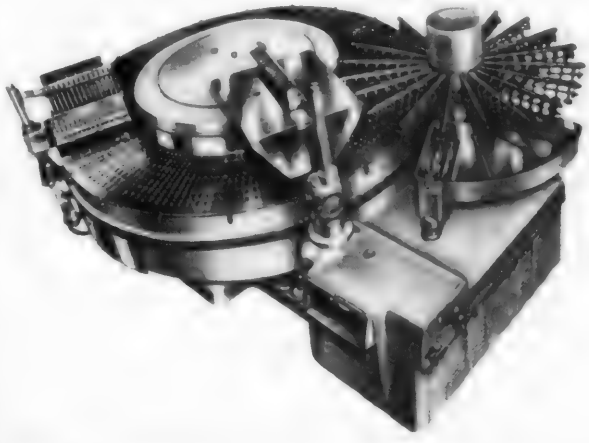
For those preferring the conventional roller churn, the *Silkeborg NZ* range provides machines of various capacity which are said to be both robust in construction and economical in operation. They are described as being especially suitable for the re-working of stored butter.

For the cheesemaker, Hiron and Rempler supply the *Silkeborg ORT* cheesemaking machine, for the mechanisation of certain stages of the process. This consists of a large, stainless-steel-lined vat equipped with a double travelling agitating mechanism which can be fitted with agitator paddles and frames or curd-working rakes as desired. The agitator is geared for infinitely variable speeds. The tank is hollow walled, and the contents can be heated or cooled by the circulation of water of suitable temperature between the walls. As well as reducing the labour costs and improving the cleanliness of the process, the machine is said to produce high-quality cheese in very good yield.

Other machines supplied by Hiron and Rempler of interest to makers of dairy products include the *Rannie* series of homogenisers, and a range of evaporating and dehydrating equipment, units of which were described and illustrated in the November, 1957, issue of FOOD MANUFACTURE.

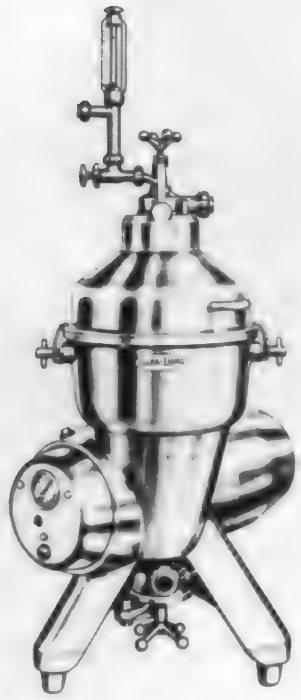
ALFA-LAVAL

Many suppliers of dairy products throughout the world employ equipment made by the Alfa-Laval Co., Ltd., whose hermetic cream separators and milk clarifiers are made in sizes to suit all scales of operation. Their *2000* series comprises machines made with stainless-steel-lined bowls and solid stainless-steel hoods and discs. Inlet and outlet assemblies are chromium plated. A cream flowmeter and regulating valve at the top of the machine allow easy process control during milk separation, and the density of the cream can be adjusted at will over a wide range. Like the companion *3000* series, these machines are available as either separators or clarifiers. When used for the latter purpose, they enable the milk to be freed from body cells and other foreign matter, and to be reduced considerably in bacterial content, without detriment to the creaming qualities of the milk. Other models include the



Top: **Conical stainless-steel butter churn of Danish manufacture, available from the Alexandra Separator, Co.**

Bottom: **The Ria-6 rotary ice cream bar freezer, also of Danish manufacture, which is available from the same firm.**



A unit of the Alfa-Laval 3000 series of hermetic cream separators and milk clarifiers.

smaller *150/151* machines, also hermetic in construction, and the series *200*, a range of semi-enclosed separators designed to eliminate foaming troubles in dairies still working with open-type plant.

A.P.V.

Wherever the question of heat exchange in liquids arises, A.P.V. equipment is almost certain to be discussed, for this is another firm whose products can be seen in food factories all over the world. Their *Paraflow Type HX* model covers the need for an all-stainless heat exchanger of medium capacity (100 to 800 gal. per hr.), and is suitable for a large number of applications. It is designed to withstand pressures of up to 100 lb. p.s.i. This is a plate-type unit, the individual plates being one-piece stainless-steel pressings, with corrugated troughs giving the surface area and turbulence necessary to achieve maximum heat-transfer efficiency.

Type HXB, a larger and more recent development of the *Paraflow* unit, has a capacity range of from 500 to 2,500 gal. per hr. at a maximum pressure of 60 lb. p.s.i.

Other equipment supplied by A.P.V., Ltd., to the dairy industry includes the *Duplex* milk filter, a large external-cloth type filter designed for the continuous filtration of up to 10,000 gal. of milk per hr. at a maximum working pressure of 45 lb. p.s.i. They also produce a unit for the deodorisation of cream, which in many countries of the world is considered an essential pre-requisite to the production of good butter.

A.P.V. are also well known for their evaporators. These may be assembled from a range of standard callandria and separators to suit the particular requirements of individual customers. The sizes available cover evaporation rates from 2,000 to 18,000 lb. per hr., single- or double-effect units being used for the smaller capacities, and the double-effect type with thermo-compression for the larger-capacity units.

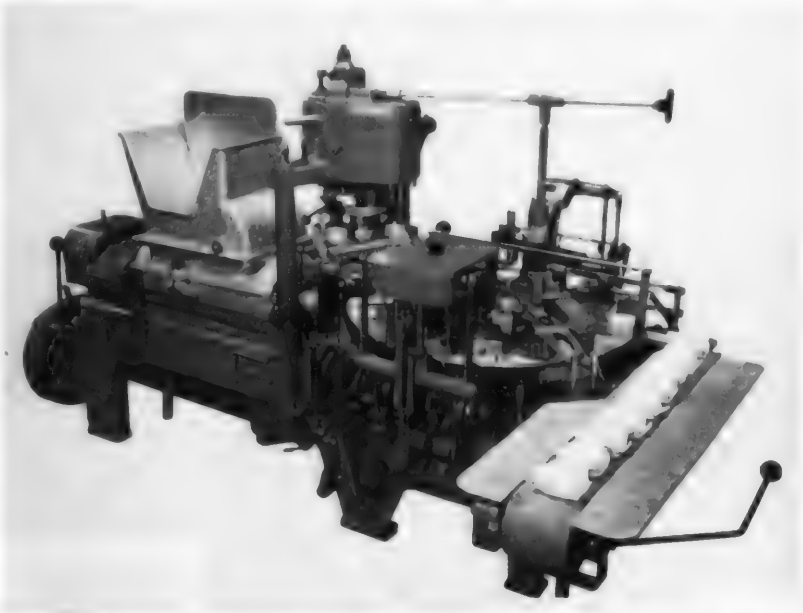
One of the most revolutionary evaporators to be placed on the market was the plate-type evaporator recently introduced by A.P.V., which was also described and illustrated in our November, 1957, issue.

CLARKE-BUILT

Heat-exchangers and a variety of other machines for the manufacture of dairy products are also supplied by Clarke-Built, Ltd. Also of one-piece stainless-steel pressing, the individual plates on the Clarke-Built plate heat exchangers differ somewhat in profile from those described above in that they rely for the provision of extra surface area and the inducement of the necessary turbulence not upon troughs but upon a series of staggered knobs. Units ranging in capacity from 100 to 2,200 gal. per hr. are available, suitable for all normal pasteurisation duties, including H.T.S.T. techniques.

The Clarke-Built *Rota-Pro*, on the other hand, is designed for less usual applications, where heat exchange is required on viscous materials or those containing a large proportion of undissolved solids. It is a rotary, scraped-surface heater, and has been widely used for fats such as shortenings and margarine, creams, etc., which can be processed at temperatures ranging from well above their normal boiling points to below 0°C.

The Clarke-Built *Senior* homogeniser also finds wide use in the dairy industry. This may be used for single or double-stage opera-



One of the Standard model butter and margarine wrapping machines, made by Kustner Brothers and Co., Ltd.

An APV cream treatment unit and stainless steel storage tanks for butter, cream, and skimmed milk at the Felinfach Creamery of the Milk Marketing Board, Cardiganshire.

tions, models being available to cover the range 200 to 400 gal. per hr. capacity. The machine incorporates a special homogenising valve with increased effective surface, together with special homogenising grids. Disc-type filter/strainers, with capacities ranging from 200 to 4,000 gal. per hr. are available as single or duplex models from the same firm.

ALEXANDRA SEPARATOR CO.

Yet another design in heat-exchange surfaces is to be seen in the plate-type pasteuriser marketed by the Alexandra Separator Co., Ltd. Of Danish manufacture, this *Kolding* pasteuriser has plates with zigzag corrugations to induce turbulence and increase the surface area. The apparatus is designed for cleaning by chemical means, but the plates are easily accessible for inspection. Sizes range in capacity from about 660 to about 3,300 gal. per hr. (3,000 to 15,000 litres per hr.), every allowance having been made in the design for subsequent extensions or the addition of new sections.

The pasteuriser is divided into sections by means of intermediate plates of laminated plastic, and the sections may include a built-in plate-type water heater, a pasteurising section, a holding section, regenerative sections in which the pasteurised milk is partially cooled by the incoming milk, and water or chilled brine cooling sections. If desired, the holding section may be in the form of stainless-steel tubes mounted on a frame alongside the unit. Where direct steam heating under pressure is desired, four safety bolts are provided and the plate stack is surrounded by a shield of stainless-steel plate.

Other equipment distributed by the Alexandra Separator Co. includes a stainless-steel butter churn, also of Danish manufacture. The churn is built in the shape of a double cone, and may be used under vacuum. It is geared for operation at eight different speeds. Also available is a *Kolding* butter pump which may be used for removing the butter from the churn. The rotors of the pump run in a nylon housing, and the pump can be easily dismantled without tools for cleaning and sterilisation.

The same firm are also agents for the *Ria-6* rotary ice cream bar freezer, which has a capacity of at least 600 doz. bars per hr. It is designed for one- or two-flavoured bars or water ices. Chocolate-coated bars can also be produced. A continuous two-cylinder ice-cream freezer with a maximum capacity of about 120 gal. per hr., and a foamless cream separator are also sold by this company.

KUSTNER BROTHERS

The Swiss firm of Kustner Brothers and Co., Ltd., make a range of machines for cutting and wrapping butter and margarine. Their *Standard* machines will mould and wrap packages of up to 1 lb. weight, the model illustrated having a capacity of 50 packs per min. The machine contains a revolving table equipped with moulds, from which the butter is extracted downwards by a wire cutter. A high degree of accuracy is claimed for this method. The *Simplex AX* moulder and wrapper has been designed for the smaller manufacturer, and has a capacity of 30 bricks per min. It can be easily adjusted for filling several weights up to a maximum of 500 g. or 1 lb., with an accuracy of $\pm\frac{1}{2}$ g. Minimum loss of water during moulding is claimed, and the method of extraction is said to allow butter to be filled without trouble at all seasons without special precautions.

Bigger machines are also available, the *High-Speed ZV* type having a capacity of 120 bricks per hr. In this model, the butter is moulded through a die in the form of a continuous ribbon, which is cut into the correct lengths by a steel wire. The *BA* type machine, which works on a similar principle, will produce 95 cylindrical packs per min.

Kustner Bros. also produce cheese wrapping machines. Their *Multiform* unit will pack processed cheese in different shapes and weights from $\frac{1}{3}$ oz. to $\frac{1}{2}$ lb. Accuracy of weight is claimed to be within $\frac{1}{4}$ to $\frac{1}{2}$%, and 40 to 60 packs per min., according to the weight, can be produced.

The *Uniform* cheese wrapper is designed to handle only one shape of pack, weight being varied by varying the thickness.

One of Graham-Enock's Gem-Cemac KA series of vacuum filling machines with Gem-Fords capping unit.

DESCO

Several pieces of equipment of interest to the manufacturers of dairy products have been announced recently by the Dairy Supply Co., Ltd. These include a cheese-waxing machine, a unit designed to apply a wax coat to cloth-bandaged cheese. The machine will handle any size of cheese from 20 to 70 lb. A hand-operated model with a capacity of one cheese per min., and a fully automatic model with a capacity of three cheeses per min. are available.

The wax normally used with these machines is a complex mixture of paraffin wax and microcrystalline waxes, in which the cheese is immersed for about 5 sec. at a temperature of approximately 280°F. The wax-coated cheese does not require turning during storage, and will store and condition satisfactorily for periods of up to six months without loss of weight. No rind is formed and mould-growth is inhibited.

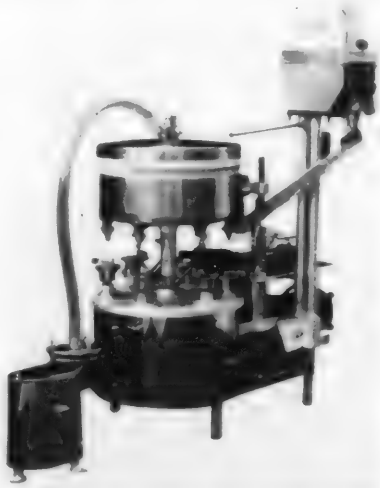
Another useful piece of equipment offered by the same firm is the Desco *Sepascope*, an instrument for the visual checking of separator efficiency. The instrument works on the principle of light transmission, the amount of light which passes through a film of milk being equated with the fat content of the milk.

Both these machines won awards at this year's Dairy Show, the former machine being awarded a Gold Medal.

ALBRO FILLERS

A series of vacuum-operated, valveless filling machines has been supplied to the dairy industry for many years by Albro Fillers and Engineering Co., Ltd., who claim to have been the original pioneers of this field. With these valveless machines, it is necessary for the bottle to connect a vacuum pipe to the filling pipe before the milk can be delivered. Filling is to a predetermined level in the bottle.

When designed for use on pasteurised milk, the fillers now incorporate a Ford aluminium capping machine. The range designed for use on sterilised milk



The Speedy filler and capper, made by Cockx and Sons (London), Ltd.

are normally connected by conveyor belt with a separate crowning machine, but some models, such as the *S.308* and the *P.156*, incorporate their own crowning units. This machine has a capacity of 1,000 gal. per hr. in pint bottles.

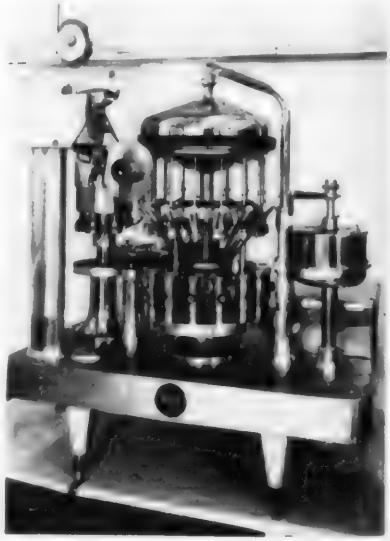
Albro also make a number of machines for filling powders such as dried milk. A single-head, a double-head, and a 15-head unit are available, the latter being fully automatic. Once again the units work on a vacuum principle, filling the tins to their capacity but to a variable density, the latter depending on the degree of vacuum used. A fully automatic machine on small tins of, say, 6 to 8 oz. can fill upwards of 9,000 tins per hr.

COCKX AND SONS

A useful machine supplied to the dairy industry by Cockx and Sons (London), Ltd., is the *Speedy* Type 6/16-head milk bottle filling machine and capping unit. This is a conveyor-fed rotary filler with a capacity of 2,200 pint or smaller-sized bottles per hr., which is available for either gravity or vacuum-assisted filling. In the vacuum-assisted unit, vacuum is drawn by means of a cased impellor powered by a ½-h.p. electric motor, the speed being stepped up to about 10,000 r.p.m. by means of a V-belt drive. The vacuum is brought in to the container by means of a 1½-in. transparent polythene hose. The filling unit and the Ford capmaker are driven by a second ½-h.p. motor. A 2 ft. 6 in. conveyor feed is fitted, and the bottles are automatically centred under the filling valves by a solid rubber star wheel. The whole machine is cased in highly polished stainless steel, and is mounted on adjustable tubular legs.

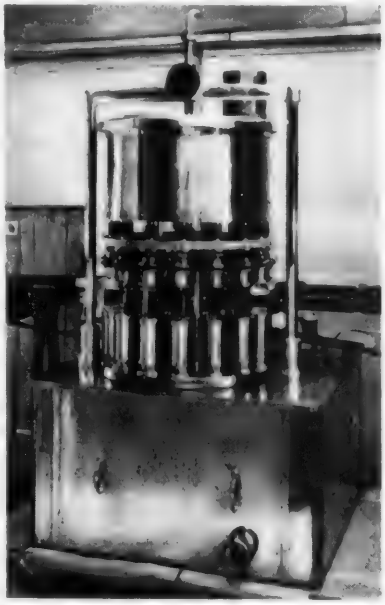
U.D.E.C.

Bottle filling and capping machines for use in the dairy industry are also made by the U.D. Engineering Co., Ltd. For the larger dairy, their *VS* and *VSS* machines cater for capacities of from 3,600 to 12,000 pints per hr., bottles



The Albro P.156 combined filling and aluminium capping machine.

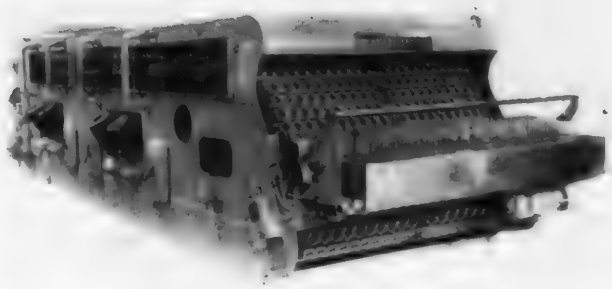
being filled and capped by separate units of the same machine. Heads for closing with cardboard discs are also available where required. Stainless steel is used extensively in the construction of these machines, which work on a vacuum-operated "no bottle no fill" principle. For the smaller dairy, the same firm's *P6/1* and *P8/1* fillers now make mechanical bottling and filling a practical and economic proposition. In both these new U.D.E.C. pedestal-type fillers the flow of the milk is gravity controlled, and specially designed



The Albro fully-automatic, vacuum-operated, rotary powder filling machine.

filling valves are said to ensure accurate and drip-free filling. The machines incorporate a U.D.E.C. built-in cap press, and can be adjusted to fill and cap all sizes of bottle. The *P6/1* machine operates at speeds up to 2,400 bottles per hr. and the *P8/1* at speeds up to 3,120 bottles per hr. Both machines can be operated in conjunction with the U.D.E.C. *M1/6* soaker-hydro bottle washer, to provide synchronised bottling plants with capacities of 2,000 pt. and 2,000 qt. bottles respectively.

U.D.E.C. produce a range of bottle washers, including single-end units with capacities ranging from 2,000 to 16,000 bottles per hr., and a straight-through washer



The KY fluid drive spray bottle washer, a straight-through machine made by Graham-Enock.

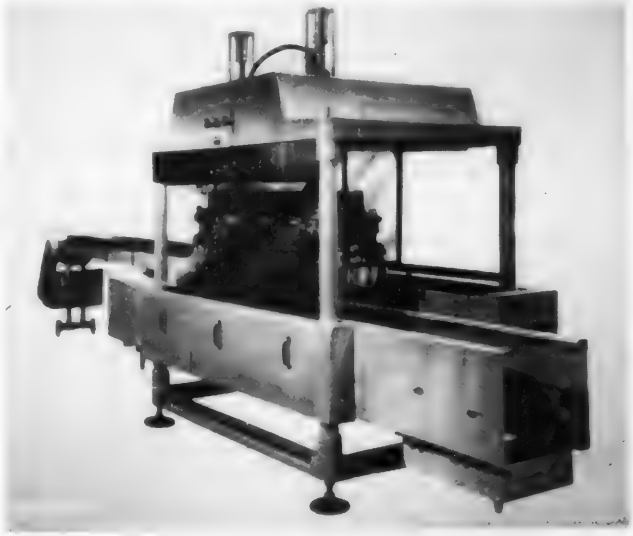
with a capacity range of from 10,000 to 20,000 per hr. All work on the soaker-hydro principle, detergent soaking being followed by detergent and rinsing sprays.

Automatic craters and decraters, of interest to the dairy industry and also to breweries and the soft drinks trade, also appear among the list of U.D.E.C. products, and a fully automatic stacker is made to handle the filled crates. The craters and decraters are available as single or as duplex units, the former having a capacity of 12 crates and the latter of 20 crates per min. The universal stacker will handle 22 crates or cases per min.

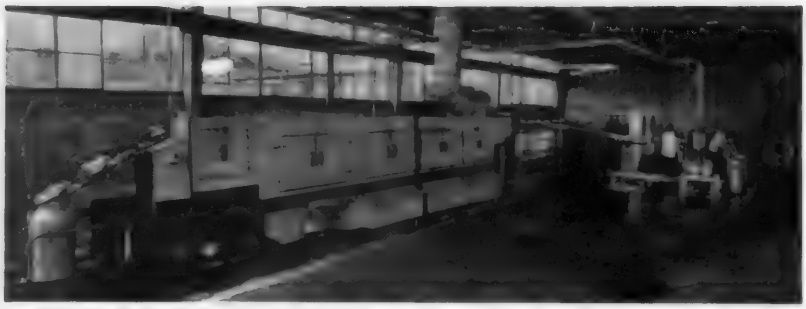
GEORGE S. CLAYTON

A range of fillers and bottle washers suitable for all sizes of operation is also made by George S. Clayton, Ltd., who claim, indeed, to supply every necessary item of dairy equipment. For the smaller operator, their hand-fed *4 F* and conveyor-fed *6 FC* fillers, which are respectively 4-head and 6-head springless-valve gravity fillers, each has a capacity of 1,600 pint bottles per hr. Both machines incorporate an aluminium capping unit. The *FV* range of vacuum-assisted fillers includes units with 6, 10, 12, 18, and 24 filling heads, ranging in capacity from 2,200 to 10,000 pint bottles per hr. Capping units are again included as integral parts of the machines. Other units concerned with filling include the *Vactor* vacuum filler, with an output of 4,500 bottles per hr., and the Unipressa capper with an output rate of 3,500 per hr. These two machines can be combined into a single, straight-line unit turning out 2,500 bottles per hr.

Other dairy equipment made by this firm includes their *Clover Leaf* retarder, a unit designed to receive milk at pasteurisation temperature, hold it at the required temperature for 30 min. in one of four



A crating and decrating machine, made by Dawson Bros., Ltd.



A specially designed automatic milk reception unit which has just been installed by the Wright Hargreaves Engineering Co., Ltd., at the Haverfordwest headquarters of Dried Milk Products, Ltd. (a subsidiary of Cow and Gate, Ltd.). This plant, which can be adapted for all conditions, handles two grades of milk at the rate of 10 cans a min. It needs three operators—an examiner, an automatic tipper controller, and a weight recorder, and can handle an intake of 6,000 gal. an hr.

hot-water-jacketed tanks, and then discharge it automatically. A plate-type H.T.S.T. pasteurisation unit, and a range of bottle-washing machines are also made by this firm.

DAWSON BROS.

The washing equipment made for the dairy industry by Dawson Bros., Ltd., is so familiar as to need no introduction. One of the latest machines added to the range of this firm's products is the *Centurion* hydro bottle washer, which was described and illustrated on p. 255 of our June, 1958, issue. This machine is available in several sizes, the largest having a capacity of 24,000 pint bottles per hr. Units designed to take quart or litre bottles are also available. The machine incorporates several novel features, including three separate detergent tanks and a non-recirculated rinsing technique. Despite these features, which have been incorporated to improve the machines performance from a bacteriological point of view, water and detergent consumption are said to have been kept at an economical level.

Other washing machines in the Dawson range include soaker-hydro models of the *Classic* series. These are available in two types. Machines in the *SCMP* range are equipped with a semi-automatic feed mechanism, and processing includes a long soak, followed by draining, a hot detergent rinse, a hot water rinse and a rinse at mains temperature. Final draining is then followed by automatic discharge. Machines in the *LCMP* series may be fed semi- or fully-automatically, and processing includes a pre-soak, followed by drainage, in addition to the steps outlined above. Capacities range from 2,400 to 4,800 pint bottles per hr. in the *SCMP* series, and from 6,000 to 10,000 in the *LCMP* series. Units are also available for other sizes of bottle.

Another Dawson machine of interest to dairymen is their *P.F.* churn washing and drying machine. In this, churns and lids are given an internal and external treatment which includes a warm pre-rinse, a hot detergent rinse, and a hot water rinse. They are then dried with hot air before leaving the machine. The machine contains special features designed to ensure that the internal washing is directed efficiently to all parts of the churn, and is available in two straight-through models, one handling 9 to 15 and the other 6 to 8 churns per min.

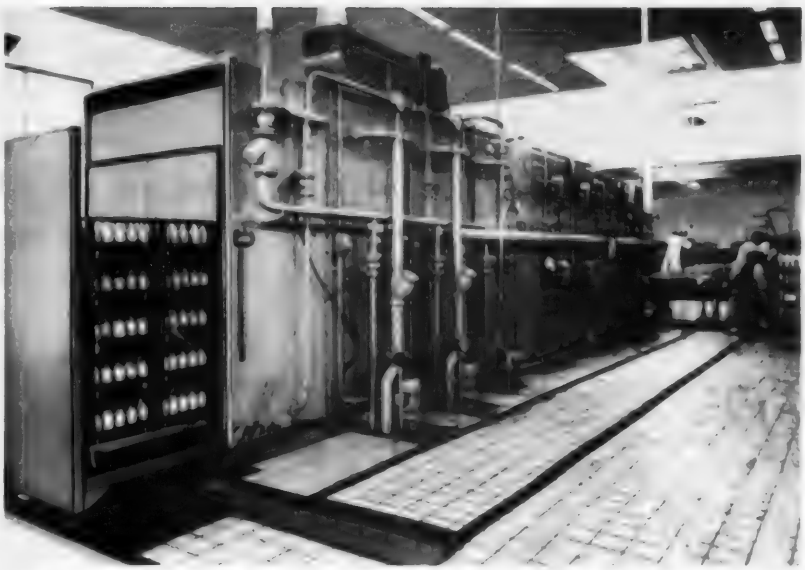
Another Dawson unit of interest to the dairy industry is their *Econster* continuous steriliser for bottled milk. This is an automatic unit adjustable for operation at any temperature between 140° and 240°F. (60° to 115°C.), with a capacity range of from 500 to 1,500 gal. per hr. Other machines made by this firm include fully-automatic "in-line" crating and decrating machines, which are available as single-, double-, or triple-head units giving a range of capacities of up to 24 crates per min. A crate washing machine and an automatic crate and case stacker are also supplied.

A York-Shipley conditioner in operation in an 8,500 gal. milk store at the factory of Newcastle and District Dairies, Ltd., at South Gosforth.

GRAHAM-ENOCK

The Graham-Enock Manufacturing Co., Ltd., also make a range of washing and filling equipment. Their *Little Gem* washer and *Little Gem-Cemac* vacuum filling and capping machine can be linked up to provide for the small dairy a compact combined installation that needs only one operator. The washer and the filler are both available in two sizes, with output rates of 1,320 and 2,640 pint bottles per hr.

The *Gem-Cemac* range of fillers, made by the same firm, comprises larger machines with output rates



The Dawson Econster patented bottled milk steriliser is made to handle bottles on their stillages. Models range in capacity from 500 to 1,500 gal. per hr.

of from 30 to 300 bottles per min. Features of the machines include automatic high-pressure lubrication, synchronised one-switch change for different bottle sizes, full vacuum and complete stainless steel construction. The electrical wiring is housed in copper tubing packed with magnesium oxide and is said to be entirely waterproof. The machines include a Gem/Ford capping unit, designed jointly by Graham-Enock and Fords.

Larger bottle washers are also available from the same firm. Their *JM Mk. II* machines will handle up to 15,000 bottles per hr., and are available in either single-end or straight-through forms. Treatment includes a detergent and three water rinses. Somewhat more elaborate treatment is given by the *KY* washer, including a pre-rinse, three detergent rinses, and three water rinses. The latter machine is available in three sizes, with capacities of 8,400, 12,600, and 18,000 bottles per hr. respectively.

APEX CONSTRUCTION

Several pieces of equipment made by Apex Construction, Ltd., have applications in the dairy industry. Their *66* range of evaporators include single and multiple effect units designed to operate at temperatures down to 70°F. These evaporators are usually constructed of stainless steel, and easy cleaning and ready access have been specially considered in their design.

The *Apex No. 68* sanitary pump is also suitable for milk products, as it is available in stainless steel and has a smooth polished interior designed for easy cleaning and sterilisation. The pump is of the centrifugal type, with a special one-piece impellor said to have a non-ærating action. A range of models is available giving heads of up to 100 ft., and with capacities from 5 to 500 gal. per min.

Other equipment made by Apex includes a double cone mixer and a Y-cone blender, which have been used for mixing the dry ingredients for ice cream, and a range of foods based on powdered milk.

WALKER CROSWELLER

The daily duties involved in the maintenance of the extremely high standard of cleanliness demanded in modern dairies require enormous quantities of water at controlled temperatures. In one London dairy with a turnover in the region of 90,000 gal. of milk per day the consumption of water is 3 gal. per gal. of milk handled. The *Leonard* thermostatic mixing valves made by Walker, Crosweller and Co., Ltd., have proved invaluable in many dairies for providing these large quantities of cleaning and process water. These valves are available for mixing either steam and cold water or hot and cold water to give emergent water of constant temperature, regardless of normal fluctuations in supply. Temperatures of 200°F. and more can be obtained, the desired temperature being preselected simply by the operation of a regulating handle. The temperature of the emergent water is controlled by a bimetallic thermostat situated in the mixing chamber, which increases or decreases the supply of hot water or steam as required by fluctuations in pressure. A similar action compensates for changes in cold water pressure. All components of the valve are accessible and can be stripped for cleaning without disconnecting the pipework, an important feature in districts with hard water.

FROZT-ED-AER

Refrigeration plays an important part in the preparation and storage of dairy products, and the Frozt-ed-Aer range of equipment, made by the Crowthorn Engineering Co., Ltd., caters for many needs in this respect. The standard *Frozt-ed-Aer* milk cooling installation employs cold brine as the cooling medium. This is stored in a tank in which are immersed the coils of an automatic refrigerating unit. A small electrically driven pump circulates the brine through the cooler. The upper half of the cooler is normally cooled by mains water, to allow the most economical use of the refrigerant. Cold rooms of various capacity, to which the coolers may conveniently be attached, are also supplied.

Frozt-ed-Aer units are also supplied for ice-cream manufacture. Model *2 F.C.1* combined freezer and conservator has a 2-gal. freezer can and a 4-gal. storage sleeve, whilst model *1 F.C.1* of the same machine has a 1-gal. freezing and a 3-gal. storage unit. Other sizes are also available. Continuous ice-cream freezers with various output capacities are also made by the same firm.

Courtesy United Dairies.

A Leonard thermostatic mixing valve in use for hosing down in a modern dairy.

Another interesting unit made by this firm is the model *M.B.* milk bar cabinet, which comprises a storage unit for milk, with a milk pump, an ice-cream storage sleeve, and syrup jars with pumps.

YORK SHIPLEY

Refrigeration and air-conditioning equipment is also supplied to the dairy industry by York Shipley, Ltd. The products of this firm include a range of 2-cylinder ammonia compressors, the cylinders varying in size from 3 in. bore × 3 in. stroke to 9 in. bore × 9 in. stroke. These models are V-belt driven, compressor and motor pulleys being grooved for multiple endless belts built up of rubber, cord, and fabric. Condensers and evaporators are also supplied. Where water is scarce, unsuitable, or expensive, or where the disposal of large quantities presents difficulties, the *York* economiser condensers are claimed to offer a well-tried solution to the problem. These sectional units are in effect a combined condenser and forced-draught cooling tower. It is said to combine high efficiency with extreme compactness, so that it is suitable for installation indoors where required. In such cases ducts are necessary to carry away the warm, humid air generated. The unit is available in a range of sizes. They are available for ammonia and Freon-12, and are claimed to effect a water saving of about 90% compared to condensers of the shell and tube type.

Another piece of refrigeration equipment supplied by York Shipley, Ltd., is a Baudelot-type flooded evaporator. Where water is required as a secondary cooling medium, temperatures very close to freezing point may be reached without danger of the evaporator freezing up. The high rate of heat transfer is also said to permit compressor operation at suction temperatures so close to that of the water that the overall performance compares favourably with that of direct expansion systems, and without their attendant disadvantages. The unit is supplied for use with ammonia or freon.

Unit coolers and air conditioners also feature amongst the products of this firm. The *York* unit coolers are suitable for use at temperatures above 35°F., or at lower temperatures when a defrosting device is provided. An improved coil design is said to allow very moderate air currents to be used, so that as well as being useful in the dairy industry the cooler is particularly suitable for cold rooms in which such commodities as fruit, vegetables and cut meats, which are prone to suffer from dehydration, are stored.

ALFRED'S ICES

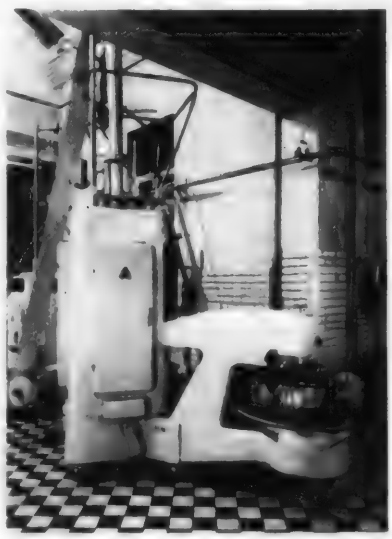
A new type of automatic machine for the production of soft ice cream has been introduced by Alfred's Ices (1954), Ltd. Known as the *Eskimo Espresso* freezer, this machine freezes the cream in small portions as it is required, and will deliver 2½ fl. oz. of ice cream from each freezing head every five seconds. Models with two, three, or four freezing heads are available, each of which may be used for a different flavour of ice. The four-head machine can dispense 2,800 portions per hr. A new company has recently been formed under the title of Mr. Softee (U.K.), which will market soft ices direct from Smith's delivery vehicles equipped with *Eskimo* continuous freezers.

TETRA PAK

Although it has perhaps not had the same impact in Britain as in Sweden, the country of its origin, and in certain other countries, the unique system of packaging liquids in tetrahedral cartons invented by Tetra Pak (represented in this country by Tetra Pak (London), Ltd.) is being used increasingly for milk and other liquid drinks. Where there exists a highly developed and widespread system of door-to-door milk delivery such as is to be found in Britain, the Tetra Pak system has certain disadvantages price-wise when compared with re-usable glass bottles, although some of these disadvantages are to a certain extent offset by economies in transport and savings inherent in the use of a one-way pack. In the U.S.A., however, the growth of self-service and the increased use of vending machines has led to a very considerable increase in the sales of non-delivered milk, and there is every reason to suppose that a similar trend will become increasingly apparent in this country.

The use of Tetra Pak in England was pioneered by the Express Dairy Co., of London, and milk is now marketed in this form in several other areas.

Tetra Pak machines are now available to cover a range of sizes



Model 500 Tetra Pak machine, which can fill milk into pint-sized tetrahedral cartons formed from a roll of material at the rate of 60 per min.

The Butterfield 1,760 gal. double - compartment stainless-steel bulk collection tanker for milk, mounted on an Albion Clydesdale 4 - wheel chassis.

from 1 quart to ½ fl. oz. in British, American and metric measures. Thus, the *1000* model can be adjusted to fill sizes of 1 qt. Imp., 1 qt. U.S., and 1 litre, and has a capacity of 3,600 cartons per hr. The *500* model, with the same capacity, handles 1 pt. Imp., 1 pt. U.S., and ½ litre sizes.

Experiments are being continued to improve the Tetra Pak system, one possible development being its adaptation to fill under aseptic conditions into sterile containers. This would allow the possibility of producing milk with a greatly enhanced keeping time by ultra-high temperature treatment, without the milk having the flavour-drawbacks associated with bottled sterilised milk as it is now produced.

W. P. BUTTERFIELD

The bulk transport of milk is assuming increasing importance in the economy of the dairy industry, and a useful machine for bulk transport by road is manufactured by W. P. Butterfield, Ltd. This consists of a 1,750 gal. double-compartment stainless - steel tank mounted on an Albion Clydesdale 4-wheeled chassis. The tanks are dull-polished internally, and each compartment is fitted with an 18-in. diameter manhole with a polished aluminium dome cover. The milk outlets are connected with the rear pumping compartment by 2½-in. stainless-steel pipes fitted with stainless milk cocks. These are connected through a manifold to a 2½-in. Howard *5MD* positive rotary pump with a capacity of 5,000 gal. per hr., which is driven from the chassis p.t.o. through a hand-operated disc clutch coupling. This compartment also houses delivery hose and valves. The tank is fully insulated with 2-in. thick *Onazote* with a vapour-sealed outer casing of light aluminium.

Phosphates in Foods

In April, 1957, a two-day symposium took place at Mainz, Germany, on "Condensed Phosphates in Foodstuffs." The papers presented, and the discussions that followed, have now been published in book form.* Perusal of the book shows that the subject was covered by the symposium with great thoroughness and on a very high scientific level. The opening and concluding addresses were given by Professor K. Lang, Director of the Physiological and Chemical Institute of Mainz University, who outlined the programme and finally summed up the conclusions reached.

The individual contributions included a paper on the chemistry and nomenclature of condensed phosphates by E. Thilo, and one on the presence of condensed phosphates in living organisms by K. Lohmann who, about thirty years ago, was one of the first scientists to prove the presence of inorganic condensed phosphates in animals. A further paper, by H. Mattenheimer, dealing with the effects of enzymes on condensed phosphates, called forth a lively discussion. Two speakers dealt with analytical methods for the determination of the contents of condensed phosphates in foodstuffs. The more specific question of the use of condensed phosphates in the meat industry was discussed by Professor R. Grau of the German Meat Research Institute, Kulmbach, and in the dairy industry by H. Mair-Waldburg. The use and effect of polyphosphate treatment of public water supplies was the subject of a contribution by P. Höfer. K. Lang reported about the results of research on the effect of condensed phosphates on animals, and a Dutch scientist, H. van Genderen, dealt with the pharmacology of condensed phosphates used as food additives.

Whilst it is obviously impracticable to do justice to all (or any) of these contributions in a brief review, it is obvious from the number and standing of the contributors alone that the symposium represented a kind of landmark in the comparatively short history of knowledge on an important aspect of nutrition and food processing.

* "Kondensierte Phosphate in Lebensmitteln." Published by Springer-Verlag, Berlin-Göttingen-Heidelberg, 1958. Pp. 183. 34 illustrations. Price DM. 27.

Electrical Stunning of Pigs

(Concluded from page 495)

It appears that the stiffness occurs most frequently when the pigs are stuck during the tonic and clonic cramps. If the animals lay on the floor until the cramps have ebbed away and then stuck, stiffness of carcasses was not observed. Thus, the short-interval method appears to be somewhat disadvantageous in this respect.

In the third and final part of this article, to be published shortly, the author considers the effects of stunning upon the pH *of the meat, and on bacterial growth and the meat's keeping qualities.*

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Biscuits by C.W.S.

New Harlow Factory to Produce 15 Millions a Week

WHEN in full production, the new C.W.S. biscuit factory at Harlow will supply 15,000,000 biscuits a week to co-operative retail societies in the Metropolitan area and South-Eastern England.

The factory has been built because it was no longer possible to meet the growing demand for C.W.S. biscuits in London and the Home counties from the Society's two other biscuit works at Crumpsall (Manchester) and Cardiff.

The first line was put into limited operation making Ginger Nuts in June, and with the recruitment and training of mainly local labour production has been steadily increased and at present has reached about a third of the plant's planned capacity of 100 tons weekly. With the Harlow works in full production the Society's total output of biscuits will be in the region of 500 tons a week.

With a skilled nucleus of production and administrative personnel drawn partly from other C.W.S. works, the new factory's labour force will total 400, 80% being women.

The factory has a floor area of 80,000 sq. ft. and is 800 ft. long by 100 ft. wide.

Planned on the most modern lines, the factory was designed by the C.W.S. architect's department, London, and constructed by the Society's building department at Barking. Engineering services were provided by the C.W.S. engineering department, and the contemporary furnishings in the office block by the building department's shop-fitting section and the C.W.S. furniture division.

The factory draws its raw materials mainly from C.W.S. sources. Flour is delivered in bulk at a rate of 700 sacks a week from the C.W.S. London flour mills, sugar by tanker, chocolate in bulk from the English and Scottish Joint C.W.S. Luton factories, and fats from the C.W.S. Irlam margarine works.

A View of the mixing room, showing the mixing pans in the rear. The method by which the mix is removed from the pans and tipped to the floor below is also shown.

The flour is unloaded pneumatically from bulk tankers into six silos with a total capacity of 120 tons. A 12- to 14-ton load can be emptied in about 75 min. The sugar is tipped on receipt into the hopper of an inclined screw conveyor, whence it passes to a bulk elevator which carries it to one of two 30 ton storage silos. The silos and pneumatic equipment were supplied by Henry Simon, Ltd.

The chocolate is pumped on receipt to two 7-ton water-jacketed storage tanks, one for milk and the other for plain chocolate, and held at 110°F. The tanks are also equipped with thermostatically controlled electric heaters, which take over when the steam boilers are out of action at the weekend.

Formulation and mixing of the biscuits is also under push-button control through a Henry Simon control panel operated by one man. By the operation of a series of switches he can regulate the run of flour and sugar from the silos, quantities being automatically weighed, to four high-speed Baker Perkins mixing machines. Each of these machines turns out half a ton of biscuit-dough per mix, average time for mixing being 4 min.—one min. on slow and 3 min. on high speed.

The dough is tipped automatically into tubs and wheeled to a Baker Perkins *Elavo*, which tips the tub and sends the dough down chutes to the baking floor. There the dough passes to the presheeter, and then to several rollers, which reduce it by diminishing degrees to the required thickness. Automatic cutting machines shape the biscuits before they are fed to one of the four production lines equipped with one gas-fired and three oil-fired travelling ovens.

Production line No. 1 is fired by gas which, although more expensive, gives finer temperature control. This line is used mainly for the production of C.W.S. Cream

Crackers, and one of the main reasons for the popularity of this line is said to be the fact that it is produced in gas-fired ovens.

Production line No. 2 is used for hard, sweet varieties such as Marie and Osborne; No. 3 turns out mainly Ginger Nuts, Tea Time, Wholemeal, and similar sweet biscuits; and line No. 4 is designed mainly for second-process types such as chocolate coated and cream biscuits.

The last three lines are equipped with Turbo-Radiant ovens in which the heat is spread by fans, to give even baking. Each oven is 180 ft. long. The baking time varies from 4½ to 10 min. according to the type of biscuit being produced. The baked biscuits flow on to cooling bands and are automatically turned on their circular journey back to the stackers. These align the biscuits ready for the nine wrapping machines, which are made by Forgrove Machinery Co., Ltd., and operate at a speed of about 50 wraps per min. A double wrap of cellophane over vegetable parchment or greaseproof is used on many varieties to give the biscuits extra protection to ensure freshness at point of sale. The cream cracker line leads to two Swiss-made Sig machines each with a capacity of 60 packets a min.

Above: **A view of the ovens, showing the gas-fired oven on the right and one of the Turbo-Radiant oil-fired ovens on the left.**
Below: **The pre-sheeter and the beginning of one of the production lines.**

This variety is treble-wrapped.

The packs are placed into tins and cartons and travel by conveyor to the Peters' tin-labelling machine and then to the dispatch room. The conveyor system is made by Heston Aircraft and Associated Engineers, Ltd.

Delivery is by the factory's own fleet of nine Ford Thames 5-ton Trader Diesel vehicles.

Biscuits are taken out of the production line for second-process work—chocolate enrobing, cream filling, or for Christmas assorted or other special packs. The chocolate enrober is by Baker Perkins, and the biscuits are cooled in a refrigerated tunnel 100 ft. long travelling on a *Pegamoid* band 240 ft. long by 42 inches wide.

Cream filling is also automatic.

The factory has a self-contained sports and social block which is used as a canteen during the day seating 200, and as a theatre with its own stage or cinema in the evenings. There is an adjacent games room for billiards and table tennis. In the same block are the medical and welfare offices.

Manager of the Harlow biscuit factory is Mr. Thomas Terry, aged 42, who has spent his whole working life in the bakery trade. He learned the craft in his native town of Blackburn, first as a boy in a private business and then with the Blackburn Co-operative Society as a confectioner.

His war service saw him eventually holding the rank of Staff Quartermaster Sergeant in charge of service bakeries in the Western Desert and Italy. After the war he was appointed bakery manager of the Cleckheaton Society, and in 1950 took up a similar post with the Stafford and Stone Co-operative Society, which he held until his present appointment.

Mr. Terry has been on the executive of the National Association of Practical Co-operative Bakery Managers for the past five years, and in 1956 was president of the Bakery Managers Midland Section.

New Chocolate Enrobing Technique

THE introduction of a new type of chocolate enrober by Baker Perkins, Ltd., is claimed to make available to the chocolate and allied industries the first fundamental change in enrobing technique for half a century. The *Baker/Sollich* enrober maintains constant viscosity of the chocolate; a twin stream circulation system ensures that accurately tempered chocolate is delivered to the enrober curtain tube at all times.

The Baker/Sollich enrober promises a fundamental change in enrobing techniques.

Condition for coating

To be in the correct condition for coating, chocolate must contain nuclei of the correct stable crystal form, so that the chocolate when cooled will solidify in a molecular formation of stable crystals which will retain a good finish through shelf life.

To contain this nuclei of stable crystals, the chocolate must be held at a temperature below the melting point of the stable crystals but above that of the unstable crystals.

Therefore, chocolate in an enrober is kept in a fluid state at a temperature below the melting point of the stable crystals. Unfortunately, however, at this temperature the nuclei grow, the crystals multiply and the chocolate will eventually become so viscous that it will not flow sufficiently to cover the centres. Furthermore, as the viscosity increases, so does the chocolate being deposited on the centres—thus giving products which are not uniform, and at the same time wasting chocolate.

If an enrober could use up the chocolate rapidly there would be no crystal growth problem. However, the tank and circulating system in a conventional enrober hold as much as 500 lb. of chocolate, and this is circulated at a rate of up to 6,000 lb. an hr., and this continual agitation helps to speed the crystal growth. If about 250 lb. of chocolate is used every hour by an enrober, this means that the chocolate can remain in the tank for as much as 2 hr. before being used.

If new tempered chocolate is added to the tank at the rate of usage or in bulk and thoroughly mixed with the old, the crystal growth in the old chocolate is not retarded.

A machine with a capacity of 500 lb. and a rate of 6,000 lb. an hr. will circulate chocolate about 12 times before using it. And each time the material reaches the wire band conveying the centres, the chocolate will be in a different state.

If the chocolate fed to the machine at this usage rate were in an untempered state, and provided that the proportions were correct, then the untempered chocolate would retard the crystal growth in the tempered chocolate and, at the same time, take on the crystal pattern of the chocolate in the enrober.

Unfortunately, however, in practice untempered chocolate cannot be fed satisfactorily to an enrober, as it is impossible to proportion correctly. Also, stoppages upset the continuity of control and cause a change in the viscosity of the chocolate.

The new enrober

The new machine embodies the principle of the established *Sollich* method of double-stream tempering, in which two streams of chocolate, one in a tempered state and the other untempered, are mixed together and tempered, the untempered chocolate being grained by the tempered stream. The machine is completely automatic in operation.

The tempering apparatus is built into the machine and circulates chocolate in a freshly tempered state to the top or bottom flow units of the machine.

All the chocolate that is not used on the centres being coated passes through the wire conveying band and is collected and returned to one of the inlets of a mixing chamber. A portion of this chocolate overflows into a heated reservoir tank and passes through a heating tube and reaches the second inlet of the mixing chamber in an untempered state. The tempered chocolate from the wire band and the de-tempered chocolate are mixed together in the mixing chamber and then pass through water-cooled tempering tubes, the material being intimately mixed as the heat is removed and finally reaching the end of the tubes in a tempered state.

All make-up chocolate is automatically fed into the heated reservoir tank in an untempered state by a built-in level switch which can electrically operate a valve in a pipeline or a pump.

Once the machine is set to suit a particular type of chocolate, it

will heat up the chocolate, start circulating and temper the chocolate at the press of a starting button. To change to a different type of chocolate, say from milk to plain, all that is necessary is to alter the setting on the main coating temperature contact thermometer by turning a knob on the front of the dial.

The machine is capable of producing full, half or bottom coatings, and can be fitted with a depressing roll and turnover roll attachment. It is so designed that the depressing roll can remain in the machine when not in use when full coated centres are being produced and it is readily detachable for cleaning.

All the working controls are situated on the operating side and are clearly marked as to their purpose.

General construction

The main body of the machine is a one-piece welded fabrication, fully jacketed and supported on adjustable feet. The minimum clearance between the frames and the floor level is 4 in., but the general clearance is 6 in.

The machine is assembled as a complete unit from the base to the wire band level, and if necessary this can be separated from the top half for installation purposes.

The top half of the machine is supported on four vertical hollow columns which are used as conduits for the electrical wiring and thermometer capillaries. The panels between the vertical columns are of perspex, the side panels sliding in horizontal guides and the end panels lifting vertically.

The lower sides of the machine are covered by removable panels which when removed give complete access to all the driving mechanisms which are housed in the lower half of the machine.

TO THE EDITOR . . .

Autoxidised and Heated Fats

SIR,—Owing to circumstances beyond my control, in my article entitled "Autoxidised and Heated Fats as a Nutritional Hazard" and printed in the September and October issues of FOOD MANUFACTURE, several reference numbers were misprinted and a technical expression misspelt. Accordingly, I should appreciate your publishing the following list of corrections:

Page 374, col. 3, para. 3: Cancel references 4 and 5.

Page 377, "Linseed Oil" separation scheme: For "cyclic monometer" read "cyclic monomer."

Page 422, col. 3, para. 3: Cancel reference 33.

Page 424, col. 1, line 23: For references 7, 52 and 67 substitute reference 64.

Page 424, col. 1, last paragraph: For reference 76 substitute reference 33.

With apologies to you and your readers.

A. A. NEWMAN.

London, N.W.11.

Foreign Matter in Food

SIR,—We refer to your leading article page 444 of your November issue under the heading "Foreign Matter in Food."

Although we agree, you do state that a prosecution "is unlikely," we do feel that this is somewhat misleading.

A number of prosecutions have arisen although not fortunately in our case hitherto, and only recently a report was contained in a local paper concerning one of our competitors who was prosecuted by the Cheltenham Rural District Council and fined £20 as they delivered a steak and kidney pie containing a metal bolt.

H. M. NEWTON-CLARE.
General Manager,
Bowyers (Wiltshire Bacon), Ltd.

▶A recent edition of the *Manesty News Letter* gives details of some of the ways in which the *Fitzmill* may be used in the confectionery industry. Applications discussed range from granulating wet or dry sugar mixes in preparation for compression to liquifying chocolate from slab.

Technical Press Review

December

Dairy Engineering.—A Year's Progress in Dairy Packaging; Dairying on Display; Plant Cleaning Routines.

Manufacturing Chemist.—Grinding Plant and Methods: Grinding and Grinding Machinery; Review of Grinding Plant and Equipment; Veterinary Antibiotic Preparations; Recent Developments in Gas Chromatography—2; Olfaction—A Comparison of Homogenous and Heterogenous Adaptation; Progress Reports: Cosmetics; Fertilisers; Detergents.

World Crops.—Tropical Crops: Seychelles Vanilla; Mechanised Cultivation on Coconut Plantations; Planting Coffee in New Areas; Production and Processing of Rice; Papaya for Export.

Chemical and Process Engineering. — Evaporation; Submerged Evaporation; New Synthetic Plant at Hythe; Chemical Engineering Economics; Cutting the Cost of Heavy Water; Analogue Computers in Chemical Engineering.

Automation Progress. — Inspection after Machining; Another Article on Automatic Gauging; Digital Counting in Industry; Changing Over to Plated Circuitry; Remote Control in the Soviet Gas Industry; Instrumentation and Control of Ice Cream Manufacture; Control Without Mathematics; Automatic Assembly of Small Components.

Petroleum.—Some Applications of High Nickel Alloys in the Petroleum Industry; Protective Coatings and Cathodic Protection in the Middle East; Large Gas Turbine Plants in Operation in U.S.A.; Free Radical Reactions of Hydrocarbons in the Gas Phase; Baton Rouge Refinery; Coking Tendencies of Lubricating Oils.

Paint Manufacture. — Testing Marine Paints; I.C.I. Marine Research Laboratories at Brixham; Epoxide Resins versus Corrosion; Paint Technology Courses at the College of Technology, Birmingham; Resin Manufacture by Induction Heating.

Corrosion Technology.—Tanks and Linings: Rubber and Ebonite Lined Storage Tanks; Heavy-Duty Tank Linings; Lead as a Material of Construction for Chemical Plant; Protection of Steel Drums; Determining the Corrosion Aggressiveness of the Atmosphere.

Advances in Food Technology

MEAT PRODUCTS

Effect of Ascorbic Acid on Micro-organisms

According to investigations carried out in Hungary by means of potentiometric measurements, ascorbic acid is electro-inactive as an oxidation-reduction system, so that its effect is due to the influence exerted on the partial oxygen of the system. Owing to its low oxygen tension, ascorbic acid affects the inactivation of the enzymes present as well as the growth of micro-organisms in food. It was found that aerobic cultures inhibit the oxidation of ascorbic acid whilst the latter, in turn, inhibits the growth of aerobic cultures. In contrast, ascorbic acid does not inhibit the growth of anaerobic micro-organisms, so that a preserving effect cannot be expected. —E. Kovacs and K. P. Marton, *Die Fleischwirtschaft*, 1958, **10**, 676.

VEGETABLE FATS

Differences in Micro-Structure

There is a relationship between certain properties of a fat, such as hardness and taste, and its microstructure. Rapidly cooled fats have a fine, uniform, more or less reticulated crystalline structure. These fats are hard and have a "smooth" taste. Slowly cooled fats have larger individual crystals which can form particles of a size up to over 200 microns. Such fats are more or less soft. The crystal conglomerates can be discerned with the naked eye as small particles in the fat. The differences in the oil percentage of hard and soft fats can be determined by oil tests of the kind used for butter.—E. Hanssen, *Fette, Seifen, Anstrichmittel*, 1958, **60**, 658.

FROZEN FISH

Palatability

Experiments were conducted on the effects of packaging material on the palatability of frozen foods in storage, and particularly herring fillet packaged in polythene, ordinary polythene being compared with that in which an antioxidant had been incorporated. Aluminium locker foil was also tested. Details are given of the treatment of the fish from the initial catch to cold storage, which, in two series of tests, lasted 4 and 6½ months. The palatability was evaluated by a taste panel of judges.

After 4 months' cold storage, there was no significant difference in the flavour of herring fillets packed in any of the materials tested, but after 6½ months, aluminium locker foil proved to be a distinctly superior packaging material. It is suggested that such differences as were found in the palatability may be associated with different oxygen permeabilities of the packaging materials.—J. D. Winter and S. Trantanella, *Quick Frozen Foods*, 1958, **20** (12), 81.

CHOCOLATES

Plastic Enrobing Plaques

"Enrobing" is the operation of pouring molten chocolate round the flavoured centre. "Plaques" are the bases on which the chocolates are carried and on which they remain during cooling. A new material for plaques is made by laminating polyethylene terephthalate film to polyvinyl chloride. The former is noted for its very high gloss, which it imparts to the chocolates. The laminate withstands frequent cleaning better than conventional materials.

The functions of the polyvinyl chloride are stated to be to render the laminate flexible, to improve the embossing which forms the pattern on the base of the chocolate, and to reduce the cost of the assembly, since the polyethylene terephthalate is expensive. Although the polyvinyl chloride does not normally come in contact with the chocolate, it is, as a precautionary measure, especially formulated for contact with foodstuffs.—Anon., *Plastics*, 1958, **23** (252) 348.

FROZEN FOODS

Packaging Materials

Palatability tests were carried out on stored frozen asparagus and peas packaged in polythene, in glass jars, and in aluminium foil, cellophane, and paper, all coated with polythene. Flavour was evaluated by a tasting panel after several months' storage at 8° to 12°F. As these temperatures are higher than normal, no conclusions are drawn as to the storage life.

The best results were obtained with asparagus and peas wrapped in paper bags coated with polyethylene, with asparagus stored in polythene bags 0·0025 in. thick and in aluminium bags coated with polyethylene, and with peas stored in glass freezer jars. For both asparagus and peas, polythene bags 0·0025 in. thick gave better result than those of 0·0015 in. thickness.—J. D. Winter, S. Trantanella, and A. E. Hutchins, *Quick Frozen Foods*, 1958, **21** (1), 28.

FREEZE-DRYING OF MEAT

Rapid Vacuum Process

A method of vacuum freeze-drying of meat has been devised whereby dehydration is greatly speeded. Heat is conducted through the dried outer layer of meat, which is a very poor conductor of heat, by the use of metal spikes fitted to heater plates. Heat conduction is uniform. It is claimed that thicker slices of meat can be treated than was possible by the use of older processes. The minimum drying time was obtained when the spikes were of aluminium, in. diameter and spaced ⅜ in. apart. The pressure is preferably below 1·5 mm. of mercury, the product being of pale colour, very porous, and rehydrating rapidly by soaking in cold water for 5 to 10 min. Flavour, tenderness, and juiciness are well retained.—C. Brynko and W. R. Smithies, *J. Sci. Food Agric.*, 1958, **9**, 9, 576.

DEHYDRATION

Actomyosin in Fish and Beef Muscle

The changes which occur in actomyosin of beef and cod muscle as a result of dehydration have been investigated at the Experimental Factory in Aberdeen.

Three criteria of denaturation were used: loss of solubility in salt solutions; loss of contractility of muscle fibres in the presence of adenosine triphosphate; and loss of adenosine triphosphatase activity.

Actomyosin, which is present in rather greater quantity than any other protein in muscle tissue, is rather labile. Therefore, its survival after treatment would indicate that many other proteins and enzymes will also remain unchanged. Changes in the condition of dried food during storage are attributed, in part, to the failure of the processor to denature the proteins and prevent enzymatic activity.

On dehydration, the cod actomyosin became insoluble but the muscle fibres did not necessarily lose their power to contract, although half of the adenosine triphosphatase activity was not destroyed. On the other hand, beef muscle fibres always remained contractile after reconstitution, although they had retained about half of their adenosine phosphatase activity.

The results were interpreted as being due to the stepwise denaturation of the actomyosin.—Sheila M. V. Hunt and N. A. Mathieson, *Food Technol.*, 1958, **12** (8), 410.

MEAT PRODUCTS

New Conceptions of Smoke Curing

Owing to the advent of modern food preservation methods, smoke curing of meat products, at one time mainly a means of meat preservation, is taking on a different aspect and is now becoming, primarily, a means of improving the organoleptic properties of the product. This shift of emphasis also entails changes in the technical process. This process comprises, essentially, two different operations: the thermal treatment, *i.e.*, the controlled drying and cooking of the meat tissue, and the actual smoke curing, now mainly applied to render the product as tasty and appetising as possible. During such processing, core temperatures of 76° to 82°C. and surface temperatures of 90°C. should not be exceeded. Smoke curing plants should be, above all, suitably designed thermal and climatic conditioning plants, permitting accurate and economic control of temperature, humidity, air circulation and quality of smoke. The conditions governing the generation and deposition of the smoke must be fully known and controlled, and any substances liable to promote cancer must be wholly eliminated. The permissible maximum temperature of the smoke appears to lie below 300°C. —Professor D. J. Tilgner, *Die Fleischwirtschaft*, 1958, **10**, 649.

DISPOSABLE PACKAGES

Polystyrene

Rigid plastic food packs are a new and growing development in food packaging. The only raw material for these, so far, is polystyrene. The products fall into four categories, the first being thin-walled, injection-moulded containers, used mainly in the U.S.A. as disposable drinking cups dispensed from automatic machines. To a smaller extent they are used for packing some solid foods such as cottage cheese. The second group consists of thin-walled vacuum-formed containers, of which the largest present use is the packaging of brawn and potted meats. Other foodstuffs used with them, experimentally or otherwise, are meat cuts, dripping and lard, vegetable salads, jellies, crab paste, shell-fish, soft fruits, trifles, shrimps, and fish and chips. A vacuum-formed polystyrene ice-cream tub with a polythene lid is also on the market and is stated to be cheaper than a waxed paper container of the same size because of thinner walls.

The third group, medium-walled injection-moulded containers, consists of those for general purposes, such as packing jams, other preserves, potted shrimps, cheese preparations, and custard powders, etc. The last category, injection-moulded punnets, comprises articles with a trellis—or grid—shape, used by fruit growers for packing soft fruits, such as strawberries and cherries. The punnets are also sometimes used in the bakery and confectionery trades.—Anon., *British Plastics*, 1958, **31** (4), 140.

CANNED FRUIT

Consumer Preferences

Bartlett pears differing in total acidity and canned with sugar syrups ranging from 30°-70° Brix were evaluated by 378 families in California. It was discovered that a soluble solids/acid ratio of between 138 and 171 measured on a hedonic scale was the most acceptable. It appeared that pears with a high acid and sugar content were acceptable as were pears less acid with a lower sugar content.

No significant differences in the evaluations were observed between the sexes but it was noted that those under 16 and above 50 preferred the sweeter produce and assigned higher scores to the samples generally. Those who tested fruit in the evening tended to give a higher score to the fruit than was given at other times of the day. Frequent consumers also gave higher values to the fruit.

Reproducible results were obtained from testing 100 families 6 months after the first tests.

Flavour was given as the greatest attribute of an experimental pack. Flavour was also the most-mentioned reason for purchasing commercially canned pears. Sweetness and pear flavour were positively associated in the minds of many of the tasters. Texture and colour were apparently unaffected by the sugar levels employed. —Rose M. Pangborn and Sherman J. Leonard, *Food Technol.*, 1958, **12** (4), 284.

VEGETABLE CANNING

General Survey

Packs of beans with pork are well known, with or without tomato sauce, or with molasses. The beans are soaked in frequently changed soft water, free from lime, for 16 hr., at 60° to 70°C. They are then blanched for 5 min. in automatic blanchers, or for 60 min. in other apparatus. They are packed automatically into "No. 2" cans already containing 1 oz. of pork. If tomato sauce is used, starch may also be added. Alternatively, blanched beans may be baked in an oven for 50 min. at 240°F. with added molasses and mustard, or for 6 hr. by other methods. Processing time is 70 min. at 240°F. for No. 1 cans, 95 min. and 115 min. for No. 2 and No. 2½ sizes respectively.

Potatoes may be canned in different forms. Whole new potatoes are canned in 1½% brine and processed for 30 min. at 240°F. in No. 2 cans or for 35 min. in No. 2½ cans. Packs are also made from French-fried potatoes, peeled and cut into chips mechanically, destarched by soaking in dilute acetic acid before frying, toasted, and salted. The product is vacuum sealed without further processing.

Vegetable macedoine packs can be made from surplus vegetables from other canning operations, provided that they are still fresh, that all vegetables used together are in season at the same time, and that each has been correctly treated for its own separate pack. The vegetables, packed in layers, and slightly pressed, are covered with boiling brine, sealed, and processed immediately at 240°F. and 10 lb. steam pressure. Cans of No. 2 size are exhausted for 3 min. and processed for 40 min.—E. Hardy, *Canning and Packing*, 1958, **28** (334), 11.

OXIDISED FATS

Flavour of Carbonyl Compounds

A close correlation cannot always be obtained between the peroxide value and total carbonyl content of fats and the degree of rancid flavour which they exhibit. A better correlation exists between flavour and volatile carbonyl content, and an empirical method for the determination of the volatile carbonyl constituents is described.

Peroxide content and non-volatile carbonyls are important in determining the shelf-life of fats, however, as these may be the precursors of the volatile compounds which cause off-flavours. The effects of processing on the development of carbonyl compounds, and the limits of primary oxidation permissible in bakery fats have been assessed.— N. W. Berry and A. A. McKerrigan, *J. Sci. Food Agric.*, 1958, **9**, 693.

Colour of Evaporated Milk

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Machinery and Equipment

AIR-POWERED STRAPPING MACHINE

A pneumatically-operated machine for tensional steel package strapping has been introduced by Signode, Ltd. It uses steel strapping in a range of sizes from ½ to 1¼ in. wide × 0·035 gauge. Some models are available with an automatic seal feed magazine, which is said to be easy to load, and the whole unit can be suspended from overhead in order to relieve the operator from undue fatigue. Strap tension can be pre-determined up to 1,600 lb., and adjustments can easily be made.

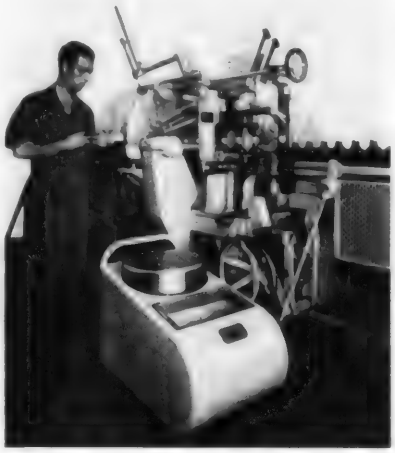
AUTOMATIC PAN-CHARGING UNIT

Further details have been released of the automatic pan-charging unit described in an article entitled "Jam-Making the Modern Way" which appeared on p. 269 of the July, 1958, issue of FOOD MANUFACTURE. Made by Robert Kellie and Son, Ltd., this unit is designed to charge a battery of six rapid-boiling jam pans. The feed valves are equipped with an electro-pneumatic circuit, and the operator, by simply pressing a button, can weigh out any pre-determined weight of ingredient without any appreciable error as frequently as required.

To operate the unit, the pre-determined weight of each ingredient is first set on the weighing-unit beam. Single trial run may be necessary to enable the machine to be set for greatest accuracy of weighing. Subsequently, once the weighing units have been set and all the services turned on, the pressing of a button opens the pneumatic valves in the product lines and the weighing cycle begins. This is automatically terminated by the electrical contacts in the weighing units which operate solenoid valves in the air lines and close the feed valves when the pre-determined weights have been reached. This cycle of operations can be repeated merely by depressing the button again. A visual check is provided on the scale of each weighing unit.

The system is designed to work with an air pressure of 50 lb. per square in., it will operate just as efficiently at higher pressures, but discrepancies will occur if the pressure drops too low and to guard against this, visual indication is provided by a pressure gauge and a pressure switch operating two signal lamps.

With this system one charge can be held in the stainless steel receiving tank, one charge in the stainless steel trough and one charge in the pressure vessel, thus reducing the time cycle of operation to a minimum. Experience has shown that one charge, *i.e.*, four ingredients, per min., can be maintained with this plant. The complete unit has all contact parts constructed in stainless steel, the cabinet encased in polished aluminium sheets.



The Mixamatic combined gum conditioning and dispensing machine in use with the Purdy Linamatic labeller on a gin-bottling line.

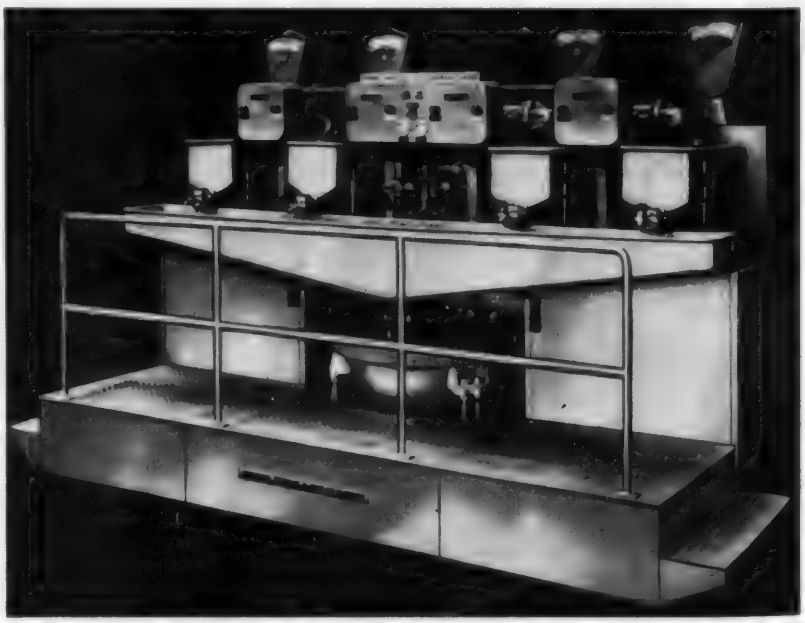
GUM MACHINE

The problem of filling the gum boxes and keeping them topped up during production, on almost all types of labelling machine in which gum is used, has always been a somewhat sticky one, and ensuring that the gum is always perfectly conditioned when required, only adds to the difficulties. The problem is also heightened when industries such as food, drink and pharmaceuticals have strict hygienic requirements. Purdy Machinery Co., Ltd., have now designed and produced a combined conditioning and dispensing unit which overcomes these problems.

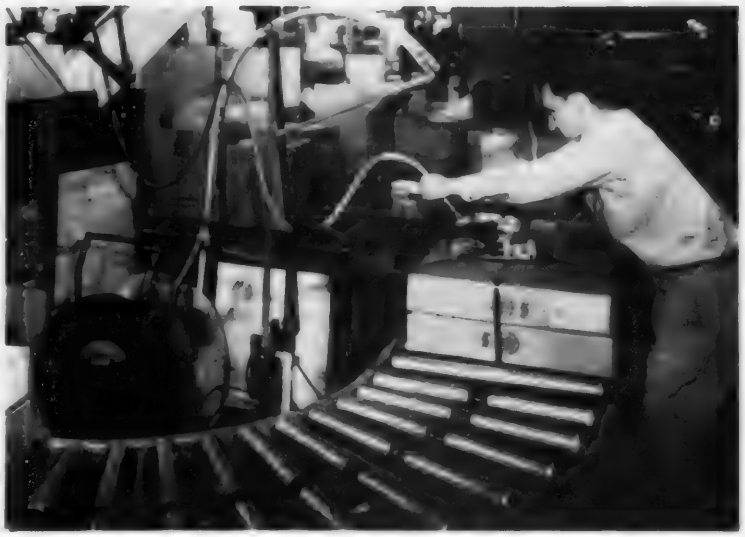
The illustration shows this new *Mixamatic* gum conditioning and dispensing machine being used to top up one of their *Linamatic* labelling machines at Gordon's gin-bottling hall in London, and gives a good idea of its compact and clean design.

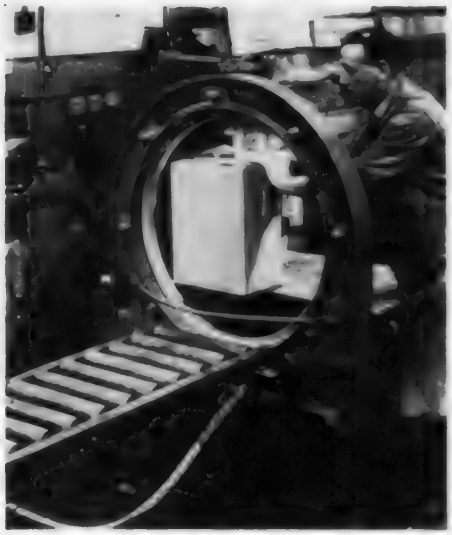
It has been designed to provide a means of conditioning gum, without additives, to its most perfect state and to dispense in that state wherever required on instant notice. The dispensing nozzle with its built-in switch, controls the driving motor, has an instant cut-off and is so designed that the nozzle itself works from 13 v. only, thus eliminating all fear of shock or harm to the operator.

Fully mobile and compactly constructed, it is easily wheeled under all



Automatic pan-charging unit, made by Robert Kellie and Son. The unit is designed to service a battery of six rapid-boiling jam pans.





Two package strapping machines recently placed on the market. On the left is shown a pneumatic machine for the application of flat steel strapping, made by Signode, Ltd. The machine on the right is an automatic model, also designed for the application of flat steel strapping, and made by Power Strapping Systems, Ltd.

normal conveyors, and will plug into the nearest 5 amp., 3-pin socket. All contact parts are in non-corrodible material, and the machine is self cleaning and will handle most types of adhesive. The tank, which has a 5 gal. capacity, is made in stainless steel, whilst the electric motor is ½ h.p. being drip proof and available for all standard voltages. The pump is of monobloc construction, is self priming, and has an approximate capacity of 48 gal. per hr. The casing, cover and impellor are in gun-metal and a stainless steel plate seals the motor shaft from liquid. The rotor and motor drive shaft are also in stainless steel.

LIFTING AND DISCHARGING MACHINE

To accelerate the discharging of drums or sacks into hopper or other containers, and to relieve staff from physical strain, a patent drum lifter and discharger has been added to the range of *Mackaness* loaders manufactured by Service Engineering Company (Northampton), Ltd.

This unit will lift and tip drums or sacks at the speed of 10 sec. for lifting and 4 sec. for tipping. It can be supplied to lift to heights of 4, 5, 6 or 7 ft. (or special heights to order), and has been designed to be positioned close to equipment into which goods are to be discharged. If desired it can be permanently secured to this equipment.

Lifting capacity is 5 cwt., and the power unit is a 400/440 v. 3-phase, totally enclosed, fan-cooled 2¼ h.p. electric motor, with direct-coupled hydraulic pump. Main bearings are of the Pollard self-lubricating and Timken pre-packed type, reducing maintenance to a minimum.

The unit measures 6 ft. × 3 ft. wide and offers approximately 9 ft. 6 in. headroom. These dimensions can be altered to suit various applications.

As an alternative the whole machine can be mounted on wheels or rails for loading any number of hoppers in close proximity to each other.

AUTOMATIC STRAPPING MACHINE

Power Strapping Systems, Ltd., (formerly Fredk. A. Power and Sons (Box Strapping), Ltd.) have now introduced the fully-automatic *Power Ribbostrapping* machine. This is a development of the automatic wire machine. It can handle a continuous flow of packages of all sizes at approximately 25 ties per min. Tension is adjustable and, once set, every strap is applied squarely and at identical tension.

Like all Power machines, this new model is supplied on the established rental system, a complete maintenance service being supplied.

The drum and sack lifting and discharging machine which has recently been added to the Mackaness range of loaders.

GEAR INDICATOR

Messrs. Allspeeds, Ltd., have designed a new type of indicator for use on their *Kopp* variable speed gear. Made of aluminium, it incorporates three counter-type numbered wheels clearly visible through a perspex window which indicate the number of turns of the handwheel to one decimal place. Because of its accuracy it is said to be particularly useful where it is desired to repeat a number of set speeds. A further advantage of this new handwheel is that a clutch is incorporated which prevents excessive torque being applied to the handwheel shaft.

Where it is desired to use remote control, it is a simple matter to unscrew the indicator and insert a flexible shaft between the variator and indicator.

Whilst primarily designed for use with the *Kopp* variable speed gear, this new indicator could be adapted to suit other types of instruments or machines where accurate and easily read control settings are required, such as full-way and diaphragm valves machine tools, etc. The design is such that it enables torque to be transmitted directly through the indicator's mechanism.

News Digest

Standard for Tomato Puree

What it is hoped will become an internationally accepted standard for tomato purees and pastes was approved at a recent meeting of the Comite International Permanent de la Conserve. Definitions are given for products which can be designated Extra Quality C.I.P.C. and Standard Quality C.I.P.C., and it is hoped that these descriptions will become universally understood and will be widely adopted as a basis for the sale and purchase of tomato products.

The standard begins with a definition of the products covered. Light, medium and heavy tomato purees will be required to contain a minimum of 11, 15, and 22% refractometric solids, respectively, not including added salt. Light, medium and heavy tomato paste will be required to contain 28, 36, and 45% refractometric solids on the same basis.

The addition of "white cooking salt," within certain specified limits, and of natural herbs and spices will be permitted, providing such addition is declared on the label. The addition of sugars will not be permitted to purees and pastes covered by the specification, although provision is made for their addition at the specific request of purchasers. The addition of other substances such as cereals and thickening agents, and of artificial colours, preservatives or sweetening agents, is expressly forbidden.

The standard then continues by listing the physical and chemical properties which shall be associated with the Standard and Extra Quality grades. The extra quality standard calls for a minimum colour defined in Munsell units, and for a lower Howard mould count (40% positive fields) than will be accepted for the standard grade (60% positive fields). Minimum limits for reducing sugars, and maximum limits for titratable and volative acidity, water-insoluble organic impurities, and copper are also set for the two grades. Minimum net weights for cans, and certain analytical procedures, are also specified.

Copies of the standard may be obtained from Dr. D. Dickinson, Liaison Officer of the Comite International de la Conserve. His address is: The Fruit and Vegetable Canning and Quick Freezing Research Association, Chipping Campden, Gloucestershire.

Biggest-ever corrosion show

Britain's biggest-ever display of anti-corrosion methods and materials will be staged in London next April. It will be the 1959 Corrosion Exhibition in the Royal Horticultural Society's New Hall, Westminster.

For four days from April 27, 69 exhibitors will show and demonstrate all that is new in the battle against corrosion, the menace which presents Britain with a £600 million bill each year. The first Corrosion Exhibition was held in October 1957. Encouraged by the success of this three-day show—which attracted 8,000 visitors—the organisers, the technical journal *Corrosion Technology*, planned an even better show. The 1959 Corrosion Exhibition is the result.

Nearly 20,000 sq. ft. of floor space will be used to show a complete range of anti-corrosion products.

All enquiries about the 1959 Corrosion Exhibition can be answered by The Exhibition Organiser, *Corrosion Technology*, Leonard Hill House, Eden Street, London N.W.1. Telephone Euston 5911.

Eradication of bovine T.B.

The Northern Ireland Ministry of Agriculture has taken its first major step towards the complete elimination of bovine tuberculosis by declaring counties Antrim and Londonderry as compulsory areas for the eradication of the disease as from September 1, 1959.

The Minister of Agriculture states: "By September 1959, I estimate that about 70% of the cattle in the two counties will have been either fully attested or will be under supervision. The final 30% will have to be compulsorily attested in the following year, during which all reactors will be bought and slaughtered so as to ensure that they do not remain in circulation.

"Other counties will follow soon after Antrim and Londonderry. It is my intention that Northern Ireland will be fully attested not long after this goal has been reached in Great Britain. I now understand that that will be in 1960 and not 1961 as we had thought." The Minister emphasised that despite difficulties which might arise it was essential that Northern Ireland should follow Great Britain's lead.

New brewery

A new brewery which has been built by Ind Coope and Allsopp at Alloa, Clackmannanshire, was officially opened recently by the chairman, Mr. Edward Thompson. It replaces one which was originally set up in 1810.

Although certain existing buildings have been retained, most of the major units have been completely rebuilt. Practically all the brewing equipment has been renewed and replaced by plant imported from the Continent. The brewery will be used exclusively for the production of lager-type beer. Output at present is 400 barrels a day, but the brewery has a capacity of over 1,000 barrels a day.

At the opening ceremony, Mr. Thompson said, "We have here today what we feel is the finest brewery in the world." He expressed the hope that the new facilities would enable the company to fight for a bigger proportion of the declining export trade, and would be the start of the British brewing industry obtaining a bigger share of the larger trade in this country, much of which is now supplied from Continental sources. He announced that the company had similar plans for the modernisation of the Wrexham brewery.

Jules Lang centenary

Jules Lang and Son, of Hatton Garden, London, are giving a dinner and dance at the Café Royal in December, so that their staff may celebrate their 100 years anniversary. This firm commenced business in 1858 under the direction of Mr. Jules Lang, who died in 1909. His son, Mr. Fernand Lang is now senior partner in the business, together with his son, Mr. Brian Lang.

The firm supplies bottles for all types of requirements from food to chemicals, glasses for the hotel and licensed trade, fancy glassware and china, and are sole distributors to the wholesale trade for *Duralex* brand toughened glassware.

Change of name

Fredk. A. Power and Sons (Box Strapping), Ltd., manufacturers of a wide range of automatic and hand strapping machines for packages of all types will in future be known as Power Strapping Systems, Ltd. This change applies only to the title of the company, policy and management remaining unchanged.

OBITER DICTA

● Canadians are being urged by the Government to eat muktuk—pickled white whale—which has long been an Eskimo delicacy. The idea is to help the Eskimo economy.—*Sunday Express.*

● Tried to eat some American camembert cheese last night. The package was imitation wood, the contents imitation cheese: three neatly wrapped triangles of soap-like goo coated with a cardboard crust.—*New York Correspondent, Daily Express.*

● Tucking into a large dish of kippers, eggs, and bacon at her first English breakfast since May (when she left to climb in the Himalayas), Mrs. Deacock said that she was " absolutely fed up with the dehydrated steak," which they had eaten for breakfast, luncheon and supper. They varied their diet slightly in Afghanistan with enormous melons.—*Times.*

● No place long and largely frequented by Britons can be cheap. It is beyond foreign human nature not to bleed us; and if we are made to pay, we in our turn insist on many things that cost money—on better furniture, bigger fires, larger washhand basins, fresher eggs, fatter beef, juicier mutton, and less stringy fowls than content the ignorant foreigner. — *From the Times of 1858.*

● The accepted minimum amount of meat to be contained in a pork sausage is 65%. Sample B 3238 contained only 60%. An original explanation of this was supplied by the makers; the low figure was, they said, due to the dry warm atmosphere absorbing the moisture, and this must, of course, have contained a certain amount of the meat juices. No prize was awarded for this effort. —*H. H. Bagnall, City of Birmingham Analyst's Report.*

● They have seen tins with a picture of a fish on the label and, sure enough, the tins contained fish. Likewise a tin of green peas has a label showing peas, and a picture of tomatoes on a tin invariably means tomatoes. The tinned goods firm that supplies us has been advised that it must find some means of convincing the natives that its baby food is made FOR babies and not OF babies.—*A. W. E. Newman, New Guinea, in the Readers' Digest.*

PEOPLE

R. W. Devereux.

John Woade.

MR. G. M. SANDIFORD, general manager of Marsh and Baxter, Ltd., has been elected to the board of directors.

▪

MR. ROBERT WAYNE DEVEREUX has been appointed sales manager of Warwick Production Co., Ltd., an associate company of the Almin group.

Mr. Devereux joined the company in 1957, after service with various other companies of the group. He is the son of the late Colonel W. C. Devereux, C.B.E., the founder of the Almin group.

▪

MR. JOHN WOADE, B.SC., has been appointed managing director of the newly formed Blaw Knox Chemical Engineering Co., Ltd. Owned jointly by Blaw Knox, Ltd., of London and Blaw-Knox Co., of Pittsburg, the new company will design, engineer, procure and erect plants for the chemical and petroleum industries and for food processing, particularly in the field of fats and oils.

Mr. Woade graduated at the University of Colorado in 1940 with a B.SC. degree in chemical engineering, following which he took post-graduate courses in business administration at the University of Pittsburg and Columbia University, New York.

▪

MR. P. HELMUT HILGELAND, managing director of Foodtech, Ltd., left last month for India and Pakistan, Australia and the United States.

In India and Pakistan he will be investigating the prospects for developing trade in British food manufacturing machinery.

In Australia he will attend a two-days' conference in Sydney, arranged by Ambco., Ltd., who own abbattoirs, stores and farms in South Australia, to give a course of instruction and demonstrations on the use of Foodtech machines which have already been installed in one factory. In addition, a range of Foodtech machines specially installed in lecture halls will be used for demonstrations to a larger public in Sydney, Adelaide and Melbourne.

In the United States he will spend some time in Chicago with executives of the meat manufacturing industry, studying the most up-to-date methods of canning, curing, packing and sausage production generally.

After his return on December 20, Mr. Hilgeland plans to invite British manufacturers to view a film of his trip.

Mobile ice cream factory

Ice cream, freshly made on the spot from vans fitted with ice cream manufacturing equipment, is now available in Britain.

The vans, based on the Karrier *Cruiser* 1 ton short-wheelbase chassis, are equipped with power plants, continuous soft ice cream freezers, conservators for ice cream mix, and a water supply. One of these vans was shown for the first time on Karrier Motors at the recent Commercial Motor Show.

The dispensing of ice cream by mobile vehicles has been developed in the United States, the biggest single American operator being the " Mister Softee " concern, which controls well over 300 mobile dispensers.

To operate a similar service in the United Kingdom and overseas a new company is being incorporated under the title of " Mister Softee (International), Ltd." The company intends to offer franchises to retailers and others interested in the distribution of freshly made ice cream.

The vehicles to operate this new fleet are to be built and equipped by Smith's Delivery Vehicles, Ltd.

The mobile ice cream factory is built on a Karrier Cruiser chassis.

Export Opportunities

Canned fruit juices—Italy

The firm of Cantine d'Italia, via Romagna, 10, Rome, have advised the British Embassy at Rome that they are interested in getting into touch, with a view to taking up agencies, with United Kingdom producers/exporters of canned fruit juices, particularly grape fruit juice.

Cantine d'Italia are an individual firm owned by Mrs. Ida Lorenzini. Mr. Lorenzini manages the business, which involves the sale of wines, oil, liqueurs and various tinned goods. Their shop is located in a commercial part of Rome and stocked with goods of the best Italian and foreign brands. The Italian concern are considered to be a suitable connection for United Kingdom firms.

Suppliers interested in this agency enquiry should write direct to Cantine d'Italia. It would be appreciated if, at the same time, they would notify the British Embassy, Commercial Department, Villa Wolkonsky, via Conte Rosso, 25, Rome, that they have done so.

Plant and equipment—El Salvador

H.M. Embassy in San Salvador reports that the Salvadorean Institute for the Promotion of Production (generally known as INSAFOP) which was set up in 1955 to encourage production in agriculture, fishing, mining and industry, has granted, or will grant this year about £85,700 to the Eastern Zone of San Miguel Milk Co operative (Cooperativa Lechera de Oriente Limitada de San Miguel, San Miguel, El Savador). This plant is expected to be in operation by the middle of next year. The plant to manufacture milk powder has been donated by U.N.I.C.E.F.

About £74,300 has also been granted to the Cattle Co-operative of Sonsonate (Cooperativa Genadera de Sonsonate Ilimitada) for buildings, pasteurizing plant, etc. (Sonsonate, El Salvador).

United Kingdom firms interested in these projects are advised to write direct to the Salvadorean concern named or, in the case of general enquiries, to the Institute whose address is, INSAFOP, 4a, Calle Oriente 16, San Salvador, El Salvador.

Pickles—Canada

The George Rogers Co., Ltd., 154, Norseman Street, Toronto 18, have informed the United Kingdom Trade Commissioner at Toronto that they wish to represent a United Kingdom manufacturer of pickles.

Until lately, the Canadian company represented a United Kingdom manufacturer of pickles, but this line has now been discontinued. The Canadian firm say that their best selling lines are sour mixed pickles, sour gherkins, pickled walnuts and piccallilly, packed in the standard small jars of eight of ten ounces (preferably square jars, though this is not essential).

The firm would buy on their own account as distributive agents covering eastern Canada. They are an old-established concern, and are distributive agents selling to chain, department and high-class grocery and food stores. They represent a number of United Kingdom manufacturers of foodstuffs and confectionery in eastern Canada but cover the whole of Canada for some products. They are considered to be a suitable connection for United Kingdom firms.

Manufacturers interested in this agency enquiry should write direct to The George Rogers Company, Ltd. It would be appreciated if, at the same time, they would notify the United Kingdom Trade Commissioner, 119, Adelaide Street West, Toronto, that they have done so.

Refrigerated Van Saves £200

A British bacon curing company, C. and T. Harris (Calne), Ltd., has recently shown the way to considerable savings in the provision of refrigerated transport. Wishing to obtain a refrigerated vehicle suitable for the local and medium-distance delivery of pies, sausages and cooked meats in factory-fresh condition, the firm purchased a 30 cwt. petrol-engined Commer van, and had the pressed steel body converted to a refrigerated unit to suit their own requirements. In this way, the construction of a specialised and higher priced vehicle from chassis form was overcome, and an estimated £200 was saved.

The body modifications, which were carried out by Bonallack and Sons, Ltd., included the construction of a full-depth bulkhead behind the driver and the provision of a cold room door in place of the standard type rear doors. The sliding cab doors were converted to hinged type with drop windows.

The body interior was insulated by fitting 3-in. timber spacers, lining with light-alloy sheet, and packing the gap between with expanded polystyrene.

A 16-gauge, light-alloy sheet overlay was also fitted to the tongued and grooved softwood floor, a trap door being provided over the back axle.

The refrigeration equipment was supplied by York Shipley, Ltd. This consists of a Yorkametic *air cooled, sealed unit mounted on a framework and carried in the passenger space alongside the driver. The hold over plates are fitted within the van body.*

New factory for Aberdeen

A new animal food plant is to be built at Aberdeen harbour by Spillers, Ltd., at a cost of about £250,000. A representative of the firm said that the plant would cater for trade in the north-east of Scotland, Orkney and Shetland, which had been carried on formerly from Glasgow. It would mean a better service for local farmers and would involve the use of local products.

The site of the plant—to which the Harbour Commissioners have agreed after a period of negotiations—would be at premises used in the past by a firm of fish curers, A. and M. Smith, Ltd. Aberdeen Harbour Board have agreed that a lease of the site (7,270 sq. yd.) at Albert Quay and No. Esplanade East be granted to Spillers, Ltd., for 50 yr. at an annual rental of £1,090 10s. until 1983 and of £1,454 thereafter.

It is also proposed that a railway siding and shed be built at Albert Quay linking it with the rest of the harbour rail system.

Food News Overseas

Wheat mill for Burma

A Czechoslovakian firm proposes to construct a wheat mill in Burma with a daily out-put of 80 tons.

Brazilian subsidiary company

The Kellog Co., of America, have formed a Brazilian subsidiary with a capital of Cr. $50 million to manufacture cereals and foodstuffs in Sao Paulo.

Sugar production in Turkey

A sugar production campaign has started in Turkey with several new refineries entering into production. The total production of the 15 Turkish sugar refineries now in activity is estimated to total 340-350,000 tons this year.

Gautemalan shrimping

A new fishing company recently began operations on the Pacific coast of Guatemala. It is a joint Guatemalan-U.S. enterprise. It has a 1,000-ton boat which can freeze 100,000 lb. of shrimps a day, and has storage space for 1 million lb. The shrimps will be marketed in the U.S.

Rhodesian developments

Perrin's Prepared Foods, Ltd., is to establish a dehydration plant near Salisbury, Southern Rhodesia, to manufacture powdered soups, dehydrated vegetables and tomato powder.

The Dairy Marketing Board is to establish a new dairy in Salisbury to handle between 20,000 and 25,000 gal. of milk a day (double the capacity of the existing dairy) at a cost of some £380,000.

Indonesian plans

Plans are reported to be in hand to move a number of inoperative sugar mills from East and Central Java to various parts of Sumatra. The Government are also planning to build three sugar factories in Celebes, of which one will be in the Goa area and another in Pare-Pare. Until now the Indonesian sugar industry has been confined to Java.

An essence factory has been inaugurated in Djakarta to produce essences for lemonade, bread, confectionery, etc. Later it is hoped to process perfumery and to build up an export trade.

Australian butter wins cup

Australian salted butter won the British Dairy Farmers' Association open Championship Cup at this year's London Dairy Show. Australia was also reserve champion in this class.

The prize-winning butter came from the Penola Factory of the South Australian Farmers' Co-operative Union, Ltd., reserve champions were R. J. Finlayson, Ltd., of Balaklaver.

Penola were also reserve champions in the unsalted butter class.

Erections and Extensions

J. Lyons and Co., Ltd., plan to build a distribution depot at Cargo Fleet Lane, Middlesbrough, Yorks.

*

Earnshaw Brothers, Ltd., are having extensions erected at their bakery in Cooper Street, Sunderland.

*

Gilford Bakers, Ltd., are extending their bakery at 54-56, Deacon Street, Walworth, London, S.E.17.

*

Co-operative Wholesale Society, Ltd., are having a soft drinks distribution depot built at Maxwell Street, South Shields.

*

Tizer, Ltd., mineral water manufacturers, are planning to build a factory on the Sealand Trading Estate, Chester.

*

Scottish Co-operative Wholesale Society, Ltd., have plans in hand to erect a flour silo at Bunhouse Road, Glasgow, Scotland.

*

Moorhouse Brothers, Ltd., mineral water manufacturers, 55, Everton Road, Liverpool, 6, are planning the erection of a factory on a site at Bridge Street, Birkenhead, Cheshire.

*

Associated Family Bakers, Ltd., opened a newly constructed bakery at Rogerstone, South Wales, on November 1. This new venture has been formed by eleven family bakers in Monmouthshire, and Gloucestershire. Chairman of the company is Mr. H. A. Kear. Vice-chairman is Mr. William Hughes.

Australian wine promotion

A trade ship promoting Australian export commodities, including wine, has been organised by the Australian Exporters' Federation. The ship, m.v. *Delos*, will visit major Far Eastern ports such as Manila, Hong Kong, Shanghai and adjacent Pacific islands; the voyage will take about two months.

Mr. Ian Seppelt, chairman of the Australian Wine Board, commenting on the mission, said that the area ranked as their third most important customer after Britain and Canada, and they were keen to develop the market still further.

Israeli dairy plant

The leading Israeli dairy plant of the *Tnuva* Co-operative for the Marketing of Agricultural Produce in Tel-Aviv, the largest of its kind in this country, producing some 30,000 litres of milk daily and also dealing with 20 varieties of milk products, is at present preparing a new type of soft cheese under the trade name *Canaan* with ingredients of cottage cheese. This will soon be supplied on the export market. The enterprise, established some 30 years ago, is in quite active trade relations with the United Kingdom. The dairy, now in a new and most up-to-date building, is equipped with modern British washing and filling machinery and installations. Equipment supplied by APV, U.D. Engineering and just recently Graham-Enock, has been installed.

Israeli pectin factory

Yakhin Canning, Co., Ltd., who have been manufacturing citrus products near Tel-Aviv, since 1941, are at present building a large new factory for the production of pectin from orange peel. So far, pectin for use in the manufacture of jam, confectionery and a number of pharmaceuticals has been imported to this country at an annual rate of about 180,000 dollars. This factory will be the only one of its kind in the Middle East. When the factory comes into operation in 1950 some 250 tons of pectin will be manufactured annually, out of which 200 tons will be available for export. Later, it is intended to increase yearly production to about 750 tons. Yakhin Canning Co., Ltd., have already many close business connections with the United Kingdom, their export items being known under the trade name "Jaffa-Gold."

Packaging

Left: **Two 3-unit packs of Munchmallows packed together in a seasonal wrapper for the Christmas trade.**

Right: **Chellies, a component of the new Viota tea cake mixture, are packed in Weldex polythene - lined pockets.**

Help-yourself packs

Attractive help-yourself packs for Macdonald's *Munchmallows* and milk-chocolate *Penguins* are now appearing on stockists' counters. The *Munchmallow* pack is printed with a base of chocolate brown on which is depicted a plate of Munchmallows. It holds 48 units, and is overwrapped with cellulose film to keep the products fresh until the pack is used. The cut-away front enables customers to serve themselves without difficulty.

The Penguin pack, which also contains 48 units, is printed with an eye-catching colour scheme of red and yellow. It is also provided with a cellulose film overwrap and a cut-away front.

Another package for Munchmallows has also been put on the market especially for the Christmas trade. This consists of two, 3-unit packs of Munchmallows, wrapped together in transparent cellulose film over-printed with holly and snowflakes.

Re-styled packs

Frears, Ltd., have now completed the re-styling of their range of packet lines by the introduction of new packs for *Festival Creams* and *Shortcake*.

Festival Creams were originally introduced for the Festival of 1951 and their immediate popularity is said to have been maintained ever since owing to their strikingly individual flavour. They are now offered in a new 7½ oz. double-wrap pack. The biscuits are contained in a greaseproof laminated cardboard tray which is first wrapped in 300/30 MSAT film and then finally overwrapped in a five-colour 300 s substance printed *Diothene* film. The background is a rich crimson and there is an illustration of the biscuits in natural colour.

Shortcake is now added to the range of Frears *Two-One* packs. (Two separate 4 oz. packets overwrapped together to form one unit—half of which will remain airtight until actually required). Shortcakes are direct wrapped, first in 400 s Biscuit wrap quality Opaline MSA opaque film, printed two colours, and then overwrapped in 300 s MSAT film to which a tear-tape is applied. The colours of the printed material in this instance are white and blue.

Polythene-lined pockets

Latest packaging role for *Weldex* polythene-lined pockets, made by John Dickinson and Co., Ltd., is coupled with Viota tea cake mixture. To pack the Chellies, used as edible decorations on the cakes, a strong moisture-resistant pocket was required. *Weldex* not only proved suitable for the purpose, but also enabled machine-filling to be used, in this case for the first time.

Measuring 3 × 2½ in., each pocket is decoratively printed by photogravure from edge to edge in red and green.

Below: **The re-styling of Frears biscuits has been completed with the introduction of new wraps for their Shortcake and Festival Creams.**

Aluminium fish cans

The Franco-Italian Packing Co., are reported to have gone over to the use of aluminium cans at their plant at Terminal Island, California. Their *Sea Boy* brand sardine fillets are now being packed in 6½ oz. oblong cans manufactured by the American Can Co., from aluminium sheet supplied by Kaiser Aluminium.

Fabrication of the cans and lithography for labelling and decoration is said to be the same as for tin-plate. Advantages claimed for the cans include lighter weight, a more handsome appearance, and longer shelf-life. The increased ductability of aluminium compared to tin-plate is also said to be valuable to the can manufacturer during fabrication, and to the purchaser in the home, where the cans can be opened with relative ease.

Trade Marks

DE HANN.—744,816. Canned meats. **L. G. Steegstra's Conservenfabriek Naamloze Vennootschap, Odijkerweg 2,** Driebergen, Holland.

EPIC.—775,036. Hams, bacon, tongues (for food), bath chaps, sausages, edible lard and meat. **The Epicure Ham Co., Ltd.,** 2, Church Row, Pershore, Worcs.

MITCHEL - QUEEN.—B775,333. Milk powder. **Mitchelstown Co-operative Agricultural Society,** also trading as **Mitchelstown Creameries,** New Square, Mitchelstown, Cork, Eire.

BETTY MARTIN.—B776,151. Brawn, brisket of beef, ox tongue, beef and ham roll, edible lard, and cheese, all being goods for sale in Warwickshire, Worcs., Staffs., Ches., Glocs., Herefordshire, Shrops., Derbyshire, Radnorshire, and Montgomeryshire. **Warriner and Mason, Ltd.,** 47, Temple Row, Birmingham 2.

HOT DON.—776,430. Meat; fish, poultry and game, none being live; meat extracts; edible oils, edible fats; and meat products, fish products, poultry products and game products, all for food. **Donnelly Dublin, Ltd.,** 35-38, Cork Street, Dublin, Eire.

ARRAY.—776,934. All goods included in Class 29. **R. H. Amar and Co., Ltd.,** 6, Holborn Viaduct, London, E.C.1.

COURT FARM.—777,416. All goods included in Class 30. **Co-operative Wholesale Society, Ltd.,** 1, Balloon Street, Manchester.

SAUCY BOY.—777,580. All goods included in Class 30. **George Mason and Co., Ltd.,** Chelsea Works, 265, Merton Road, Southfields, London, S.W.18.

SYDGROCE.—778,006. All goods included in Class 30. **Sydgro, Ltd.,** 243, Beckenham Road, Beckenham, Kent.

FRUIT FAIR.—767,544. Fruit-flavoured sugar confectionery (not being medicated). **Chix Confectionery Co., Ltd.,** 15d, Argyll Avenue, Trading Estate, Slough.

THE BAKER'S MAN.—773,178, and **THE BAKER'S BOY.**—770,306. All goods included in Class 30. **G. W. Lunn and Sons, Ltd.,** Star Bakeries, Doncaster Road, Wakefield.

CHALLENGE BLUE ROOM.—777,508. Tea **Nichols and Co. (Sheffield), Ltd.,** Shalesmoor, Sheffield 3.

PORPOISE.—774,074. Animal feeding stuffs. **Atlantic Alginates, Ltd.,** Ballyconneely, Clifden, Galway, Eire.

ROMP.—777,972. Foods for animals. **Pettitts of Reedham, Ltd.,** Reedham, Norfolk.

HI—FI.—774,857. Fruits, fish, poultry and game, all being canned; preserved vegetables, dried fruit; jellies (for food), jams, preserves, marmalade, mincemeat, fruit curds; eggs; edible oils, edible fats; pickles; bacon, sausages, black puddings, tripe, suet; caviare; soups, soup powders; whey, essence of rennet, junket, condensed milk, yoghurt, yoghurt preparations; piccalilli; potato chips; salad oil; and fish cakes, fish pastes, meat pastes and poultry pastes. **Essonia, Ltd.,** St. Andrew's Works, Woodhead Road, Bradford 7, Yorks.

FRESHLAND.—776,459, and **FRESHDALE.**—776,593. Eggs (for food). **M. Reich, Ltd.,** 66, Nelson Street, Commercial Road, London, E.1.

PAN YAN.—777,743. All goods included in Class 29. **Maconochie Brothers, Ltd.,** 140-142, Great Portland Street, London, W.1.

NESTLES.—778,107. Chocolate coated biscuits. **The Nestlé Co., Ltd.,** Hayes, Middlesex.

KERBO.—777,752. Meat and meat products (for food), fruits and vegetables, all being preserved; and fish (not live). **Ker, Bolton and Co., Ltd.,** The City Chambers, 1-6, Railway Place, 65a, Fenchurch Street, London, E.C.3.

TREBOR "P" NUTS.—777,208. Non-medicated chocolate and sugar confectionery, all containing peanuts. **Robertson and Woodcock, Ltd.,** Trebor House, Woodford Avenue, Ilford, Essex.

WINKS.—776,651. Sausages. **T. Wall and Sons, Ltd.,** "The Friary," Friar's Place Lane, Acton, London, W.3.

ISLAND FRESH.—777,271. Poultry (not live) and eggs (for food). **G. M. Angear,** Le-Comptrehard de Bas, Guernsey.

COURT FARM.—777,415. All goods included in Class 29. **Co-operative Wholesale Society, Ltd.,** 1, Balloon Street, Manchester.

SUMMER DAY.—769,693. Fruits and vegetables, all being preserved, cooked or dried. **Fine Fare, Ltd.,** Wigmores North, Welwyn Garden City, Herts.

BOUNTY FLOUR.—764,672. Flour for sale in the counties of Beds., Bucks. and Herts. **Bounty Flour Co., Ltd.,** The Marsh, Leagrave, Luton, Beds.

TOBLER MANDARINETTE.—776,420. Chocolate, chocolates and non-medicated confectionery. **Chocolat Tobler, Ltd.,** 20, Soho Square, London, W.1.

SUGUS.—777,904. All goods included in Class 30. **Suchard Holding Society Anonyme,** Place St. Francois 14B, Lausanne, Switzerland.

JACKPOT.—778,085. Non-medicated confectionery. **Welch and Sons, Ltd.,** Norham Road, West Chirton, North Shields, Northumberland.

KIT-E-MEAT.—777,718. Meat foods for cats. **Kit-E-Kat, Ltd.,** Melton Mowbray, Leics.

POL-PRO-VIT.—779,182. Foodstuffs for animals. **Grossmith Poultry Foods, Ltd.,** London Road, Aston Clinton, Aylesbury, Bucks.

REGAL.—778,213. Eggs, butter, edible oils and edible fats. **H. & C. (Retail), Ltd.,** 179-189, City Road, London, E.C.1.

New Companies

Bag of Sweets, Ltd. (611351.) Mnfrs. of and dlrs. in chocolates, sweets, etc. £100. Subs.: A. E. Isemonger, 317, High Holborn, London, W.C.1., and Daphne P. Abbott.

Barbecue (Food Products), Ltd. (611219.) 21, Red Lion Street, London, W.C.1. £1,000. Dirs.: Stephen Kennedy and M. D. Beckman.

Beaumont's Confectionery, Ltd. (611007.) Exchange Buildings, Grainger's Lane, Cradley Heath. Confectionery mnfrs. and dlrs. £1,000. Dirs.: L. J. and Ella G. Beaumont.

Davies, Hellard, Ltd. (611042.) 240, Whitechurch Road, Cardiff. Confectionery mnfrs. and dlrs. Dirs.: M. V. and Mavis A. Hellard.

T. G. Davies, Ltd. (592942.) 249, Penarth Road, Cardiff. Mnfrs. and dealers in confectionery, chocolates, sweets, ices and cooked and prepared foods, etc. £1,000. Dirs.: T. G. and Mrs. M. E. Davies.

Filby's Bakeries, Ltd. (611296.) 38, St. Margarets Street, Canterbury. £5,000. Subs.: H. D. Simnett and L. T. Horner.

Greywing Poultry Products (Arun), Ltd. (611151.) 31, Clarendon Road, Leeds, 2. £100. Dirs.: J. T. and Mrs. Marion F. C. Hitching.

J.E.H., Ltd. (611182.) Mnfrs. and dlrs. in confectionery, etc. Subs.: Donald Best, 15, Gladstone Road, Rawdon, Leeds, and Derek Chambers.

L. Lee and Sons, Ltd. (611207.) "Fair Ridge," Parkgate Road, Newdigate. Wholesale catering suppliers, bakers, confectioners, etc. £100. Dirs.: Leonard Lee, D. C. and Gladys L. McLagan.

Petworth Dairies, Ltd. (610686.) Flathurst Dairy, Horsham Road, Petworth, Sussex. £10,000. Dirs.: G. W. Harrison, G. R. Robinson, W. H. Wareham and R. T. Cross.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

COMPANY MEETING

GEO. ADLAM & SONS

(Manufacturers of plant and machinery for chemical brewery, bottling and refrigerating, vinegar brewers, chocolate, and other food manufacturers)

The 51st ordinary general meeting of Geo. Adlam and Sons, Ltd., was held on November 14 in Bristol, Mr. W. Walker, J.P. (the chairman), presiding.

In his circulated statement, the chairman, having referred to the completion of the reorganisation and concentration commenced after the reversal of 1952, continued:

Dealing now with actual trading, there was a set-back in the Company's earnings, which it is believed was of a temporary nature, and arose from two causes. I referred last year to a change in policy by producing more products in your Company's works instead of buying from sub-contractors, particularly overseas suppliers. Excellent technical progress in the production of special and larger tanks in stainless steel, in the Company's works in place of on site with disturbance to the customer, has taken place. Inevitable "teething troubles" have taken place which has affected profits.

The second cause related to certain contract work executed for some years for an organisation which sold articles produced under licence. The licence terminated during the year with adverse effect on the profits pending introduction of new work, and these two causes account for the temporary set-back.

The Directors recommend a dividend of 10%, less tax, for the year to March 31, 1958, on the Ordinary Capital but, in view of progress since made and to avoid hardship by reduction in the total payable, they have declared an interim dividend of 10%, less tax, on account of the year to March 31, 1959.

The report was adopted.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

802,736. AMERICAN CYANAMID CO.: Antibiotic composition for extending the storage life of foodstuffs.

802,487. J. LEOPOLD and Z. FENEL: Process for the production of yeast.

802,632. S. A. JONES: Method of and means for making filled cakes, particularly eccles cakes.

802,512. DOW CHEMICAL CO.: Animal food supplements for the treatment of gastro-intestinal parasitic diseases.

803,071. E. STRAUSS: Process for the production of egg products.

803,123. AMERICAN TANSUL CO.: Starch product.

802,834. GENERAL FOODS CORPORATION: Popcorn flavouring apparatus.

803,421. C. REID: Vegetable food substance and process for preparing same.

ABSTRACTS OF BRITISH PATENTS

Toffee manufacture

In making high-grade toffee, the mixture of ingredients, after heating, is cast on to a cooling slab and allowed to harden before cutting up as required. Working or deformation of the toffee while it is still plastic is avoided, as causing a deleterious effect attributed to exudation of fat. The use of a continuous process has hitherto been precluded.

It is now proposed to pre-cool the toffee from its final temperature in the cooker, about 257°F., to a temperature, about 170°F., at which it is just liquid. From this temperature down to about 130°F., the toffee keeps its shape until it has cooled to room temperature. While still just liquid, it is forced into a tube of desired cross-sectional shape, through which it passes at a pre-determined rate such that the temperature on leaving the tube is about 130°F. The deformation required for shaping takes place while the toffee is still liquid. After leaving the tube, the "rope" of toffee, extruded, now incapable of further deformation, is passed to cutting and wrapping machines. Temperatures other than those given above are required for other types of toffee. A continuous process is thus provided.—801,318. *George W. Horner and Co., Ltd.*

Fatty products

The invention, relating particularly to edible fatty products such as butter substitutes, comprises preparing a highly packed oil-in-water emulsion in the presence of an emulsifier, at an elevated temerature, with subsequent partial phase inversion by mechanical means. A highly packed "oil-in-water" emulsion is defined as one containing at least 74% of oil in which every oil particle is in contact with adjacent particles.

In the first of 14 examples, the aqueous phase was prepared by dissolving one part of stearoyl sarcoside in distilled water containing enough sodium hydroxide for neutralisation. Citric acid was added to bring the *p*H to 3-6, then more water to make up to 40 parts. To the aqueous phase, at 60°C., with stirring, were added slowly 160 parts of melted butter fat. The resulting 80% oil-in-water emulsion was homogenised in two stages at 140 and 160 ats. pressure. This emulsion, which was stable, was kept at 0°C.-3°C. for 3 days to crystallise the dispersed fat, after which the temperature was allowed to rise to 13°C. The emulsion was then mechanically worked by passing several times through perforated plates, whereby phase inversion took place. The product is stated to have a texture finer than that of butter, and quite different from that of a conventional margarine.—801,118. *Unilever, Ltd.*

Moulded confectionery

Hollow figures of crystallised sugar or like edible materials are normally produced by casting in plaster moulds made in two or more parts, which are placed together to form the complete moulds. The latter are filled with a hot solution of the sugar to be cast and allowed to cool until solidified sufficiently, when the portion still liquid is poured out. The mould parts are separated and the cast figure removed. The drawback of this method is that the parts of the mould need to be soaked in water for some time, to remove residual sugar, before another casting can be made.

In the present invention, the step of soaking in water is eliminated by interposing a layer of a suitable thermoplastic material, such as polyvinyl chloride, between the plaster of the mould and the sugar solution. This layer, which adheres to, or is attached to, the plaster, has its inner surface made to the exact configuration of the articles required. There being no appreciable adhesion between sugar and the plastic surface, soaking in water is rendered unnecessary.—801,197. *J. Morton.*

Edible emulsions

Highly packed fatty oil-in-water emulsions suitable as raw materials for making artificial cream, artificial milk, salad sauces, and mayonnaise, as well as industrial products, may be prepared by using emulsifiers other than those mentioned in B.P. 801,118. These new reagents have the general formula RXY, in which R is a hydrocarbon radical containing at least 8 carbon atoms in a straight chain, X may be oxygen, sulphur, nitrogen, or one of several organic radicals, and Y is an inorganic or organic radical containing at least one water solubilising group of the class comprising carboxylic acids, sulphates and phosphates of alkali metals, etc., and polyoxyalkylenes, substituted or not.

In the first of four examples, an aqueous phase was prepared by dissolving one part of stearic acid in distilled water with enough sodium hydroxide for neutralisation. Citric acid was used to bring the *p*H to 7·5-8. The aqueous phase was made up to 40 parts with additional water. An 80% oil-in-water emulsion was made by adding slowly 160 parts of soyabean oil, with stirring by a turbomixer. The resulting emulsion was homogenised in two stages at 140 and 60 ats. respectively. The product was stable. The dispersed fat particles were mainly 1-5 microns in size, with a small fraction up to 25 microns.—801,119. *Unilever, Ltd.*

Food protection

The invention relates to the protection of the surfaces of edible commodities against deterioration during treatment or when cut for display or sale, more particularly the preservation of the surfaces of bacon during smoking. Considerable wastage of spoilt cut surfaces is claimed to be avoided.

In principle, a plate is fitted in close contact with the meat surface, and held firmly in position by means of a system of spring hooks fitted to the plate, each hook consisting of a coil spring bearing on the external surface of the plate and a hook member passing through each of the numerous holes in the plate and anchored in the commodity. The plate is thereby pulled into continual close contact with the latter. The apparatus is shown in a sheet of drawings appended to the specification. The plate may be of any suitable material such as glass, metal, porcelain, or a plastic.—800,937. *T. E. Linnel, P. R. Linnel, R. E. Linnel, and T. R. Linnel.*

Preserving the colour of red meat

The colour of red meats—viz., beef, pork, lamb and veal—is preserved, for a time, by packaging in films of rubber hydrochloride, to meet public objection to meat which has become discoloured in any way. The rubber hydrochloride has an ester plasticiser content of 25-40 parts, of which at least 10 parts is a di-alkyl adipate, to each 100 parts of rubber hydrochloride. Other ingredients—*e.g.*, other plasticisers, "non-blocking" or "non-fogging" agents—may be present.

The di-alkyl adipates must be permanent liquids, that is, they must not be too volatile, as is di-isobutyl adipate, they must not crystallise at refrigerator temperatures, and they must boil at 150°C., at least, at 4 mm. pressure. Experiments are described, in which, to a basic formulation of 100 parts of rubber hydrochloride, 1·5 parts of "Carbowax" 1500 di-laurate (the lauric acid ester of a polyethylene glycol), and 1·0 part of "Santocel" (a cellular silica), were added, in 15 examples, various plasticisers, singly or in pairs. The results of the tests applied are tabulated. The preferred plasticisers are 2-ethyl hexyl diphenyl phosphate and di-2-ethyl hexyl adipate.—799,478. *The Goodyear Tire and Rubber Co., U.S.A.*

Abstracted from the Official Journal of Patents and from published specifications. These publications are available from the Patents Office, 25, Southampton Buildings, London, W.C.2.

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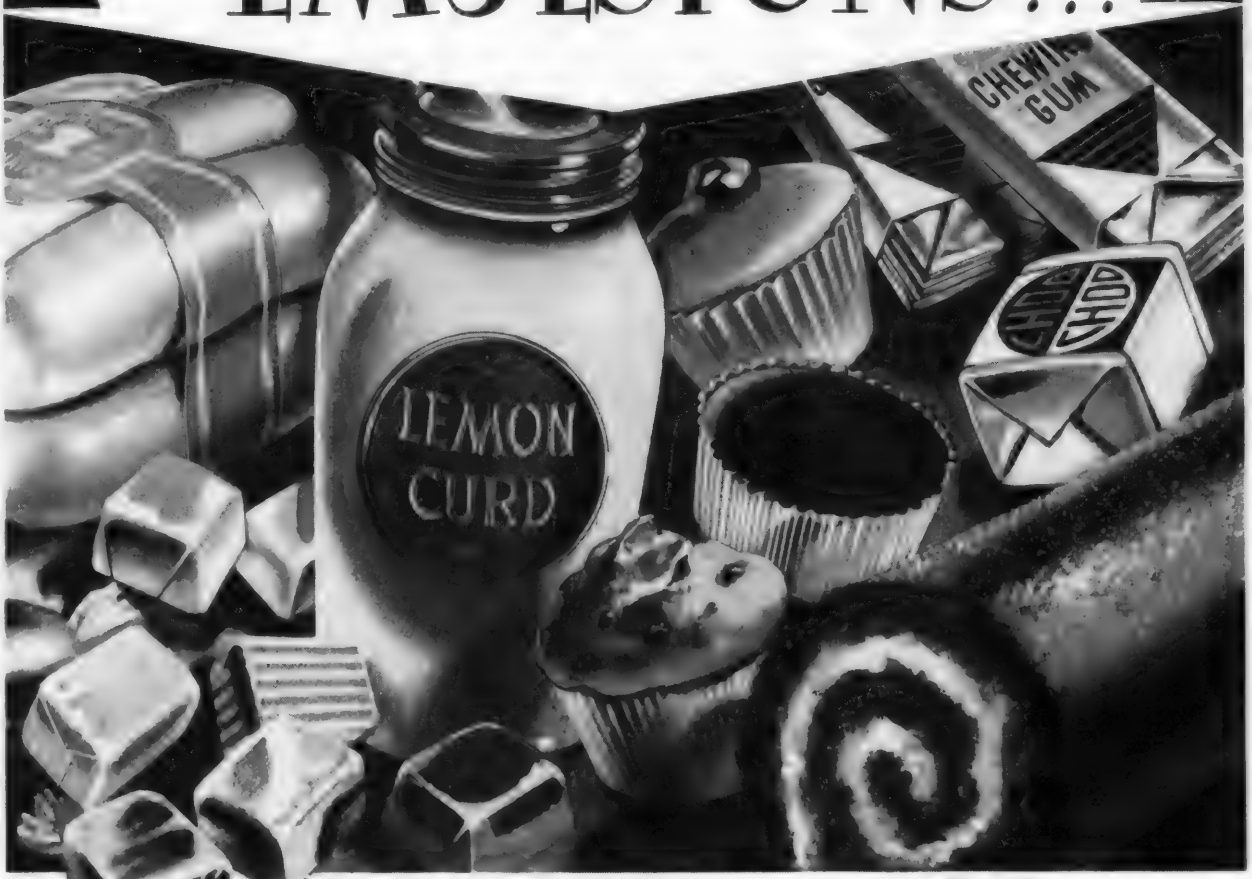

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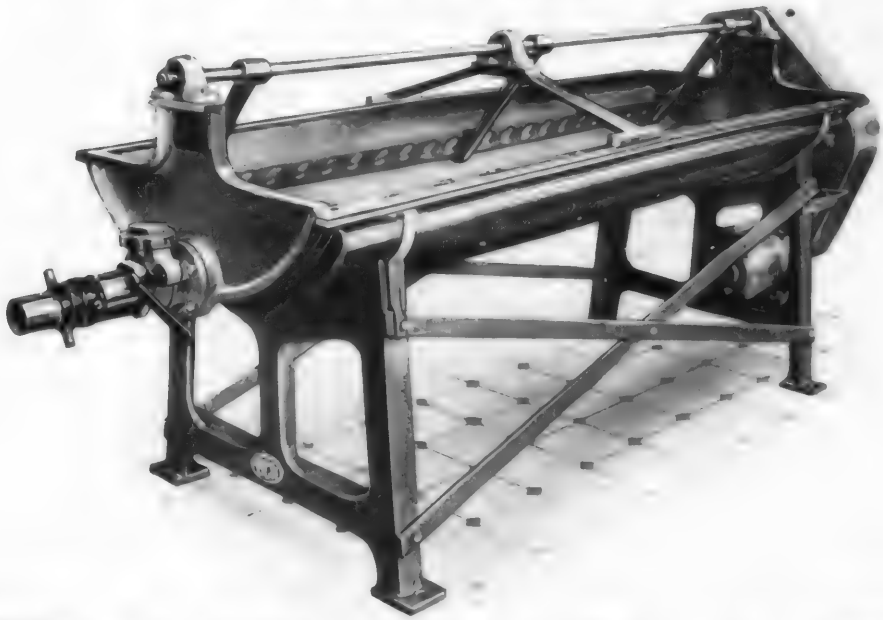

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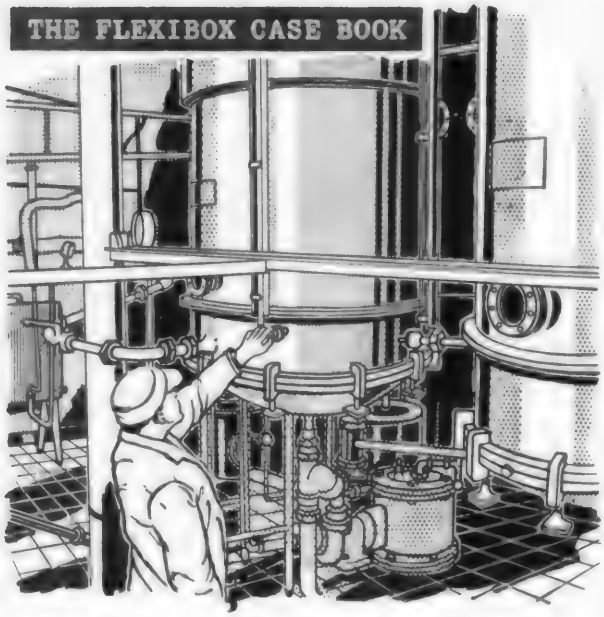

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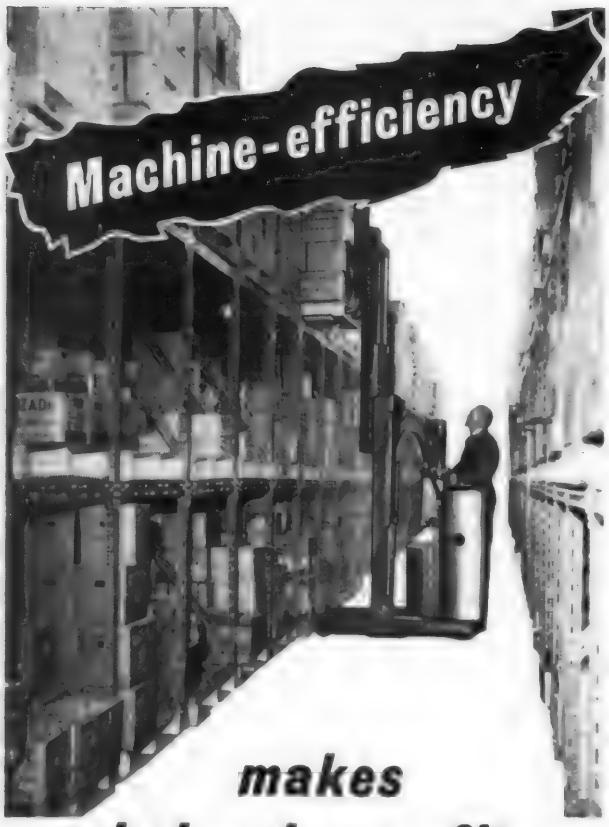

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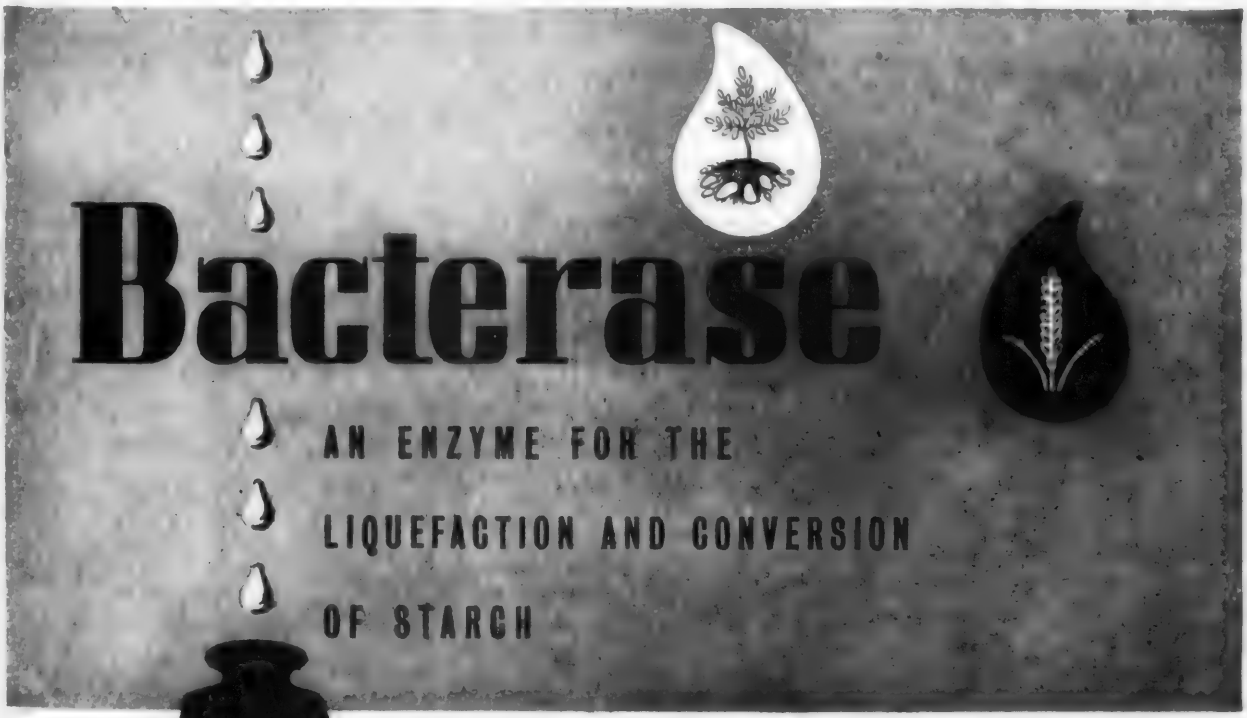

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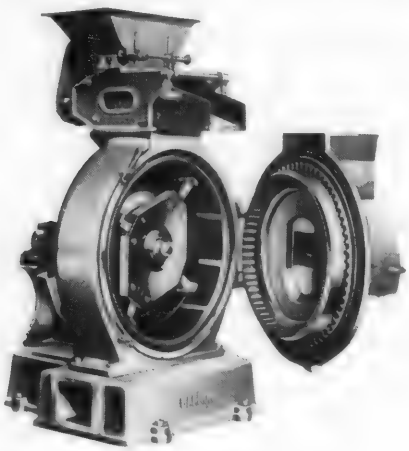

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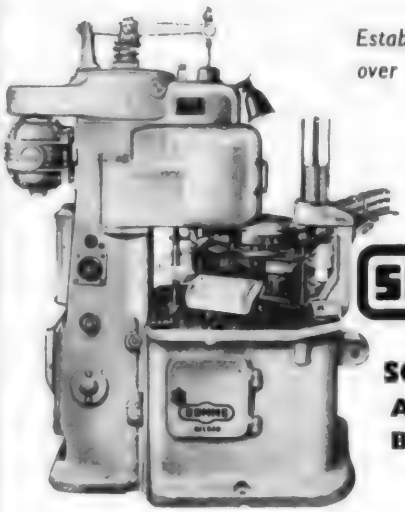

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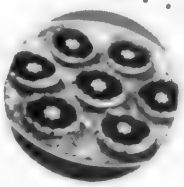

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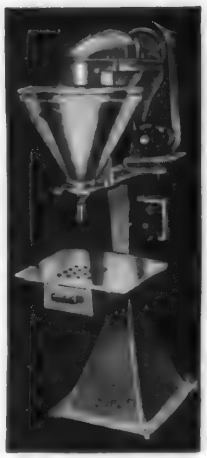

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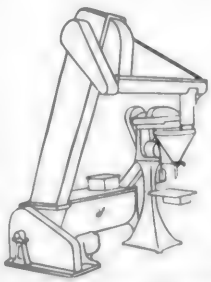

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Phew-w . . . . Page A89

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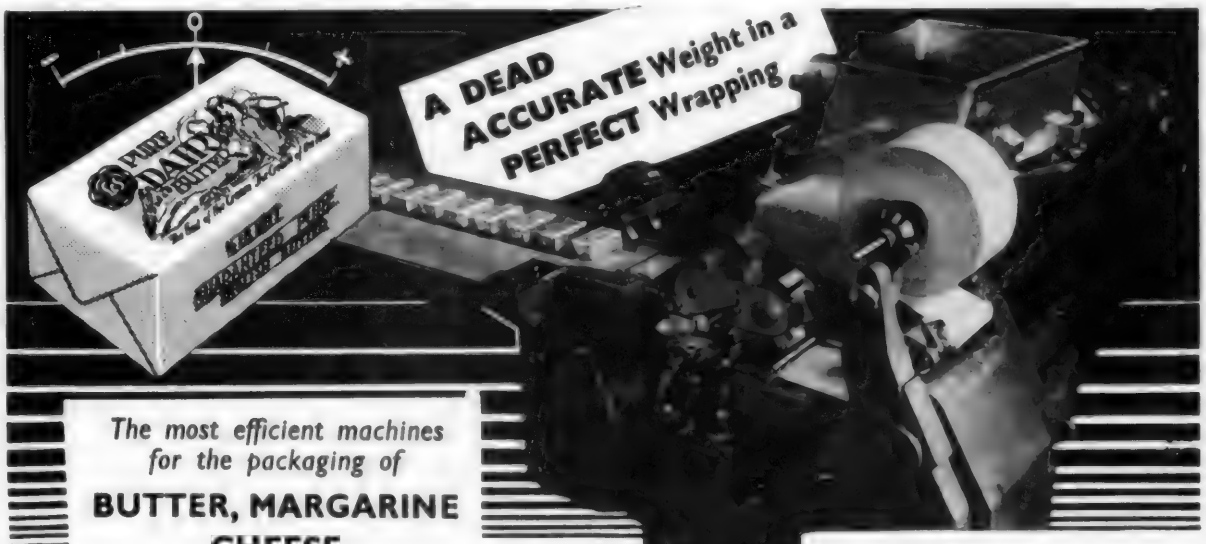

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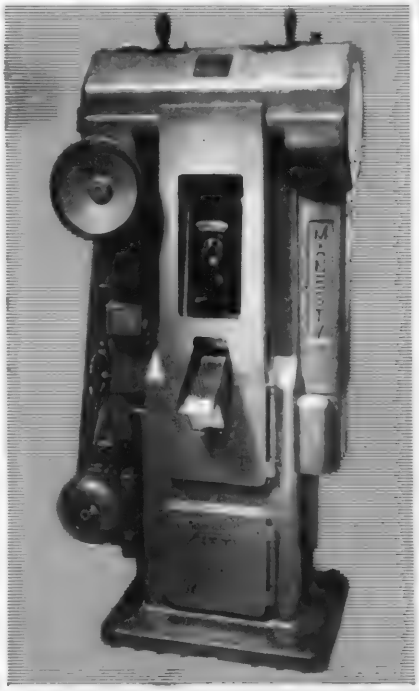

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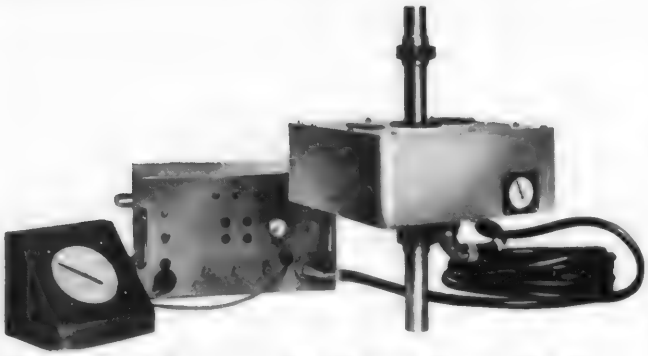

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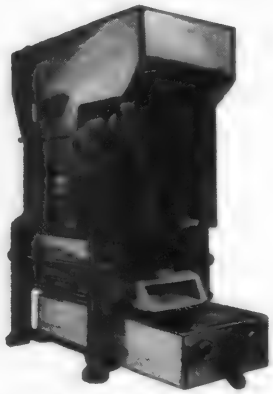

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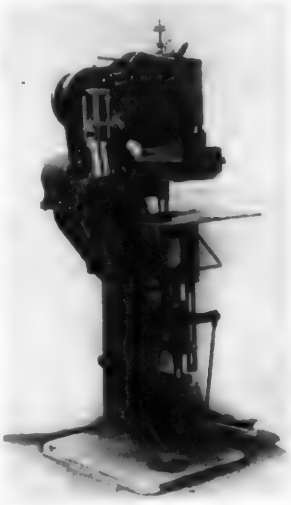

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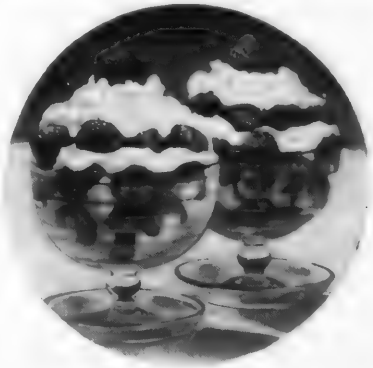

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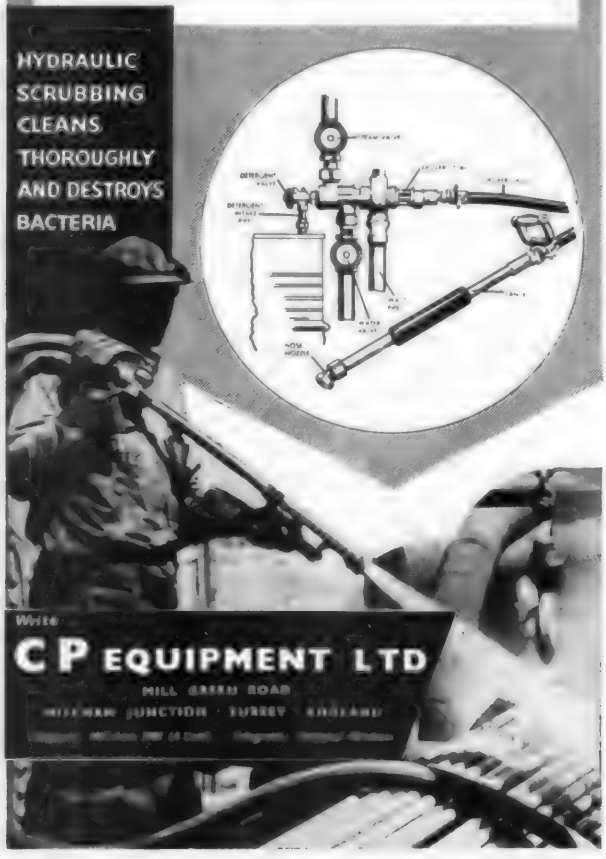

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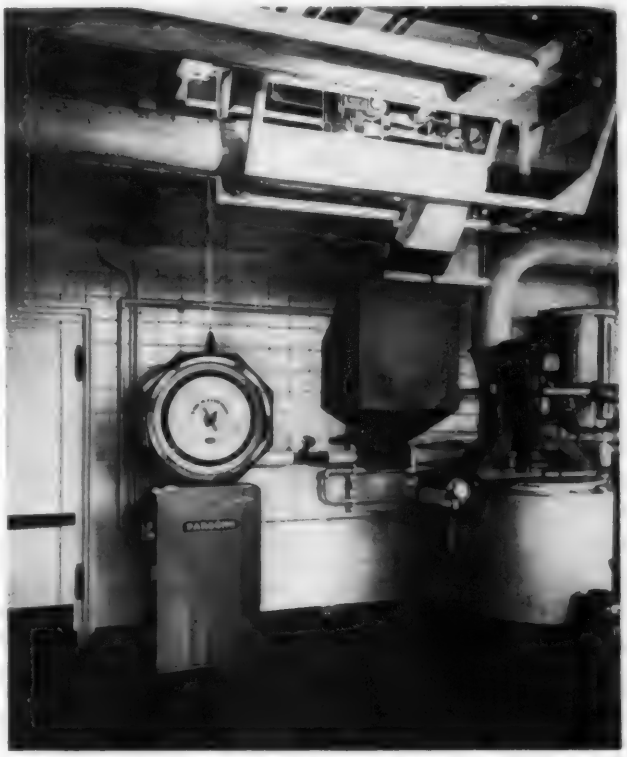

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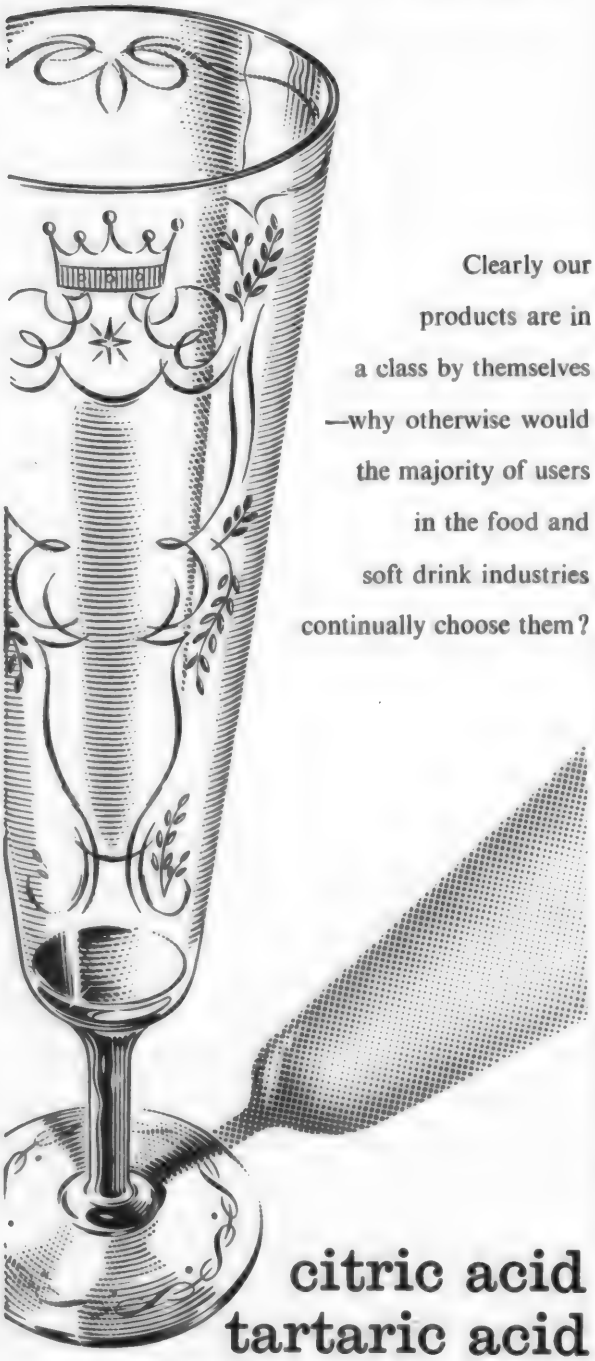

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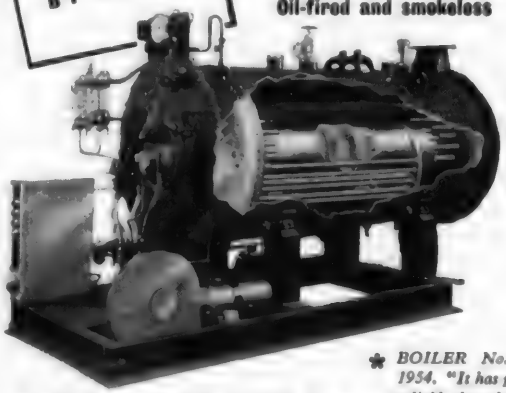

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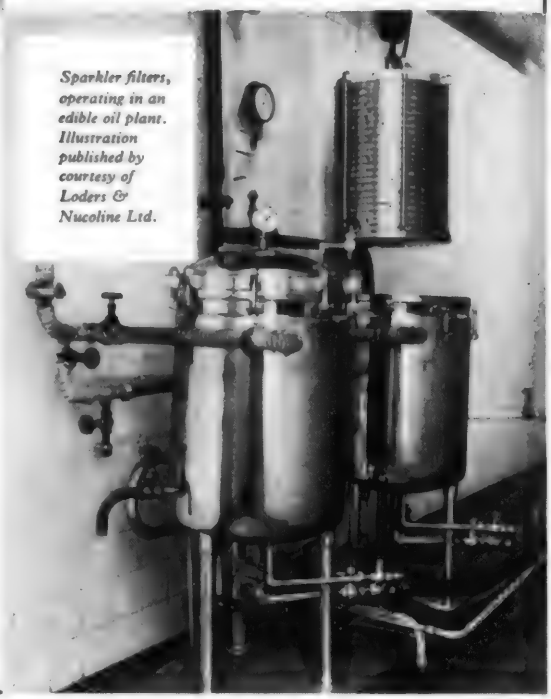

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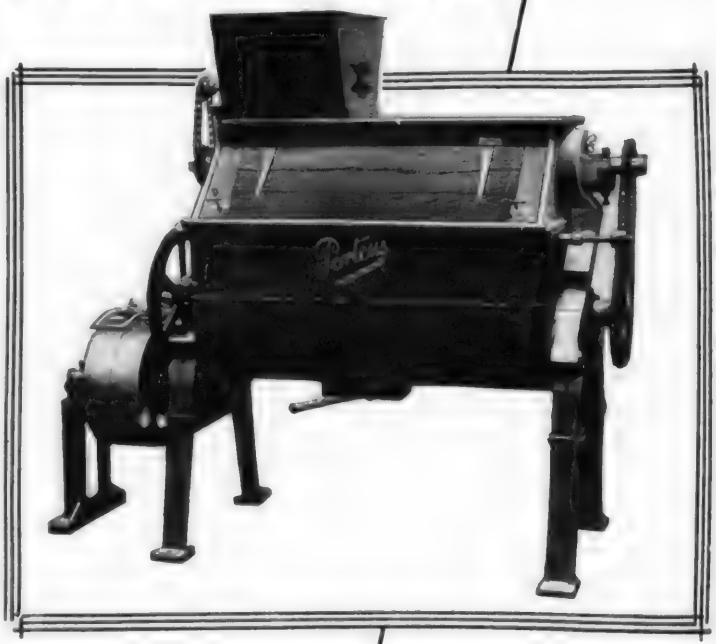

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CHEMISTS and Assistant Chemists. The Co-operative Wholesale Society Ltd. invite applications for the above positions, which call for analytical and development work in the new Laboratory of the Society's Food Factory situated near Manchester. Minimum qualifications for Assistant Chemists will be Higher National Certificate or Ordinary National Certificate together with desirable experience in the analysis and technology of animal and/or vegetable fats and oils. Graduate Chemists with the necessary experience will be appointed to the senior positions. Attractive conditions of employment and pension scheme available—salaries will be commensurate with qualifications and experience.—Applications, giving full details of age, education and qualifications to date, should be addressed to the C.W.S. Ltd., Central Labour Department, 1, Balloon Street, Manchester, 4, endorsed "Chemists" and "Assistant Chemists," to be received not later than December 8, 1958.

PHYSICAL Chemist required to carry out research work in connection with wide range of food products. First or Second Class Hons. Degree in Physical Chemistry and some research experience desirable. Good salary. Luncheon Club. Superannuation Scheme.—Application in writing to Group H.O. Personnel Manager, T. Wall and Sons Ltd., The Friary, Acton, W.3.

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THE proprietor of British Patent No. 735530, entitled *Method of Milling Whole Grain Kernels for Producing a Non-rancidifying Product*, offers same for licence or otherwise to ensure practical working in Great Britain. —Inquiries to Singer, Stern and Carlberg, 14, E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

THE proprietor of British Patent No. 713925, entitled *Potato Chip Construction*, offers same for licence or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14, E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

COMPANY, Share capital £10,000, agreed Tax losses £20,000 approx., Directors loans £10,000, for disposal. Articles of Association emphasise Canning, Quick Freezing, general food manufacture.—Box B5769, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

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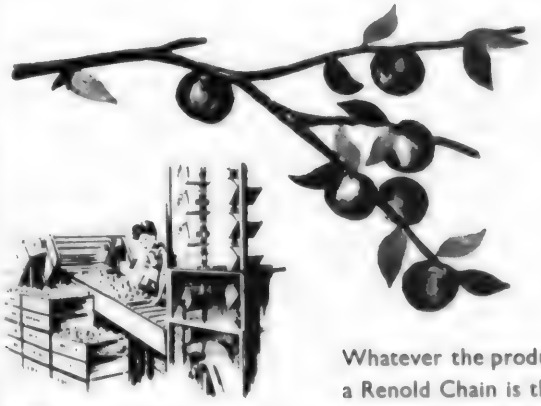

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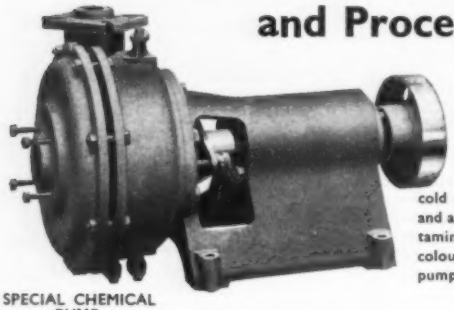

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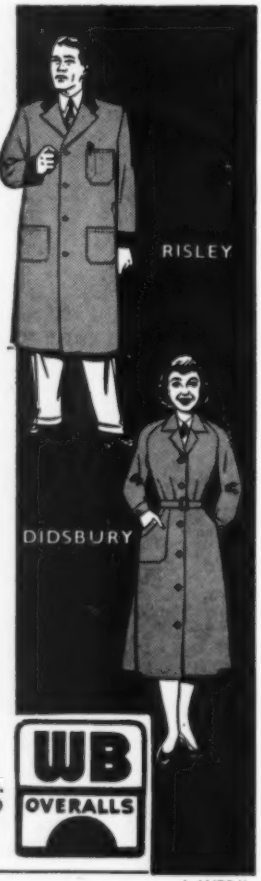

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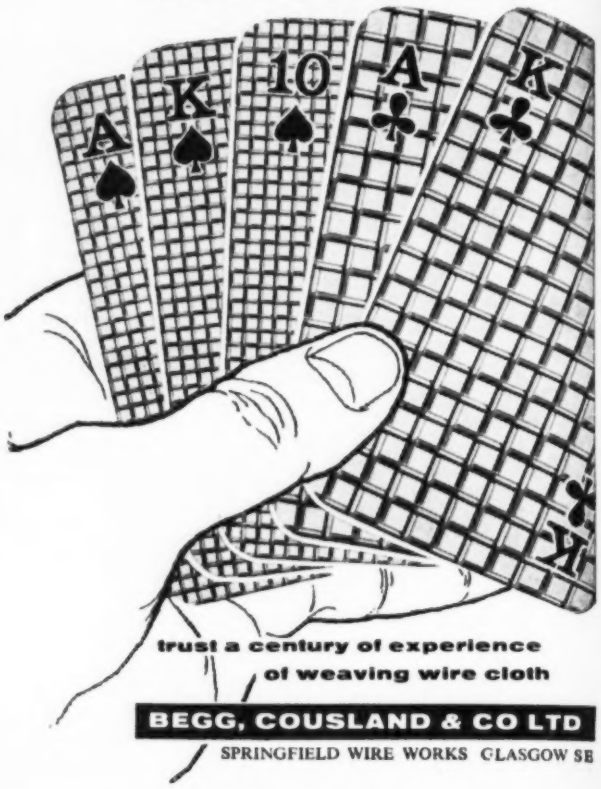

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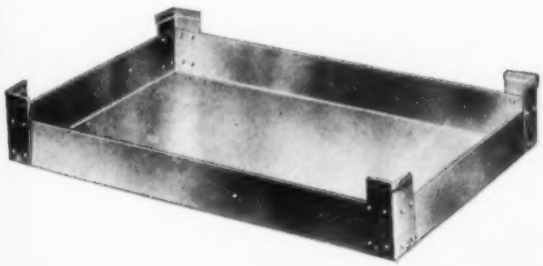

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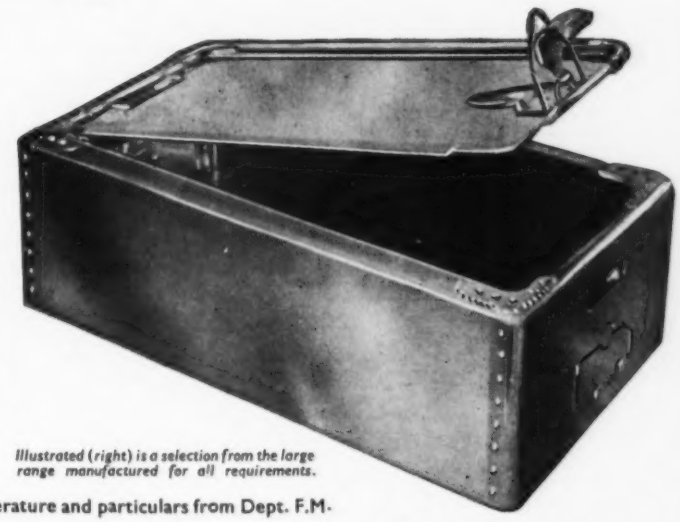

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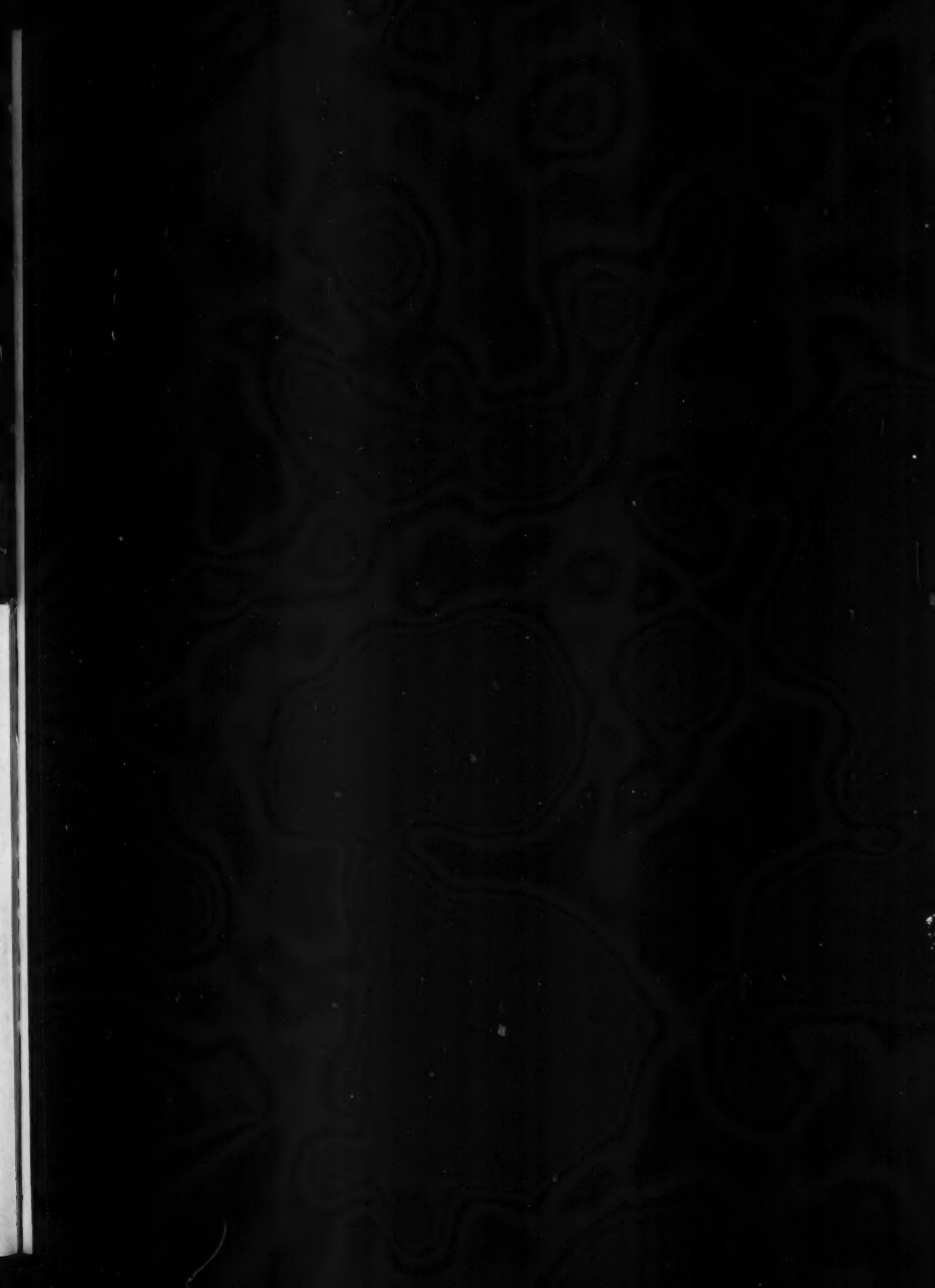
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